HANGAR 9
WE GET PEOPLE FLYING

ULTRA STICK™

.40-SIZE VERSION

INSTRUCTION MANUAL

- 90% prebuilt
- Hardware included
- Precovered trim scheme
- Everything included to build the conventional two-aileron wing version or quad flap version

90% PREBUILT ARF
ALMOST READY-TO-FLY

Specifications:

Wingspan:		57 3/4"	1467 cm
Length:		51"	1295 cm
Wing Area:	Standard:	700 sq in	4516 sq cm
	Quad Flap:	715 sq in	4613 sq cm
Weight (approximate):		5 – 6 lb	2.3 – 2.7 kg
Recommended Engines:	2-Cycle:	.40–.58	
	4-Cycle:	.50–.72	

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AMA Safety Code 81

Introduction

Important

Before beginning construction of your Ultra Stick™ 40, decide which wing configuration is best for you—the conventional two-aileron version or the quad flap version with two ailerons and two flaps.

With the conventional two-aileron wing, the Ultra Stick 40 is an outstanding sport aircraft. This configuration offers excellent slow speed and stall characteristics that allow even inexperienced pilots to feel at home. Plus, it offers aerobatic capabilities that will have your flying buddies drooling. If you're using a 4- or 5-channel non-computer radio, the conventional two-aileron version is your best choice.

To get the most out of your Ultra Stick 40, we strongly suggest using a 6- to 10-channel computer radio and building the quad flap wing configuration. If you're relatively new to flying or aren't totally confident about your abilities, don't let the quad flaps scare you off. Quad flaps can actually make your Ultra Stick 40 easier to fly!

Quad flaps allow your Ultra Stick 40 to perform in many amazing ways that just aren't possible with an ailerons-only equipped airplane. With a little practice, you'll be able to use crow mixing to do amazingly short landings from high altitudes. You'll do takeoffs within the length of the fuselage with takeoff flaps, high speed rolls with aileron-to-flap mixing, and super-tight loops with elevator-to-flap mixing. Plus, you'll have fun learning about your computer radio and its capabilities.

Don't miss out on all the possible fun. Build your Ultra Stick 40 in the quad/flap configuration. If you're a bit intimidated about all of that programming complication, we've provided an easy-to-follow programming guide in the back of this manual that will walk you through every step of the way. Whether you own a JR 6-, 7-, 8-, or 10-channel computer radio or a Futaba 8, step-by-step instructions make programming easy!

If you encounter difficulty in any construction sequence, please contact one of our technicians—we stand ready to provide any assistance we can concerning the construction of your Ultra Stick 40. You can contact us at:

Horizon Hobby, Inc.
4105 Fieldstone Road
Champaign, IL 61822
(898) 504-0233
www.horizonhobby.com

Warning

An R/C aircraft is not a toy! If misused, it can cause serious bodily harm and damage to property. Fly only in open areas, preferably AMA (Academy of Model Aeronautics) approved flying sites, following all instructions included with your radio and engine.

Additional Required Equipment

Radio Equipment

4 channels (minimum)
5 servos (JR 527 or equivalent) or 7 servos for quad flap wing option
Standard 600–1100mAh receiver battery pack

Note: A Y-harness and a reversed servo is required if a 5- or 6-channel radio is used for quad flaps.
A servo Y-harness with reverse, like Expert's 320 (EXRA320), can be used.

Recommended JR Systems

JR F421EX
JR XP631
JR XP652
JR XP8103
PCM10X
PCM10Sx
PCM10SxII

Engine Requirements

.40 - .58 2-cycle engines
.50 - .72 4-cycle engines

Recommended 2-Cycle Engines

MDS .40FS Pro/MDS .58FS Pro

Recommended 4-Cycle Engines

Saito® .50 - .72

Parts Needed (not included in kit)

Aileron Extension - 12" (2) (JRPA100)
(4 aileron extensions required for the quad flap wing option)
Propeller (Refer to propeller recommendations for the operating instructions of your engine)
Foam for cushioning tank
Fuel tubing - 12"

Tools and Supplies Needed (not included in kit)

Adhesives

Thin CA (cyanoacrylate) glue
Medium CA (cyanoacrylate) glue
Thick CA (cyanoacrylate) glue
CA remover/debonder
6-minute epoxy
30-minute epoxy
Threadlock Z-42
Masking tape

Tools

Drill
Drill Bit: 1/16"
Medium Phillips screwdriver
Z-bend pliers
Pliers (needle-nose)
Hobby knife with #11 blade
Epoxy brush
90-degree triangle
Straight edge
Measuring device (e.g., ruler, tape measure)
Scissors
T-pins
Moto-tool with cut-off wheel
Round file

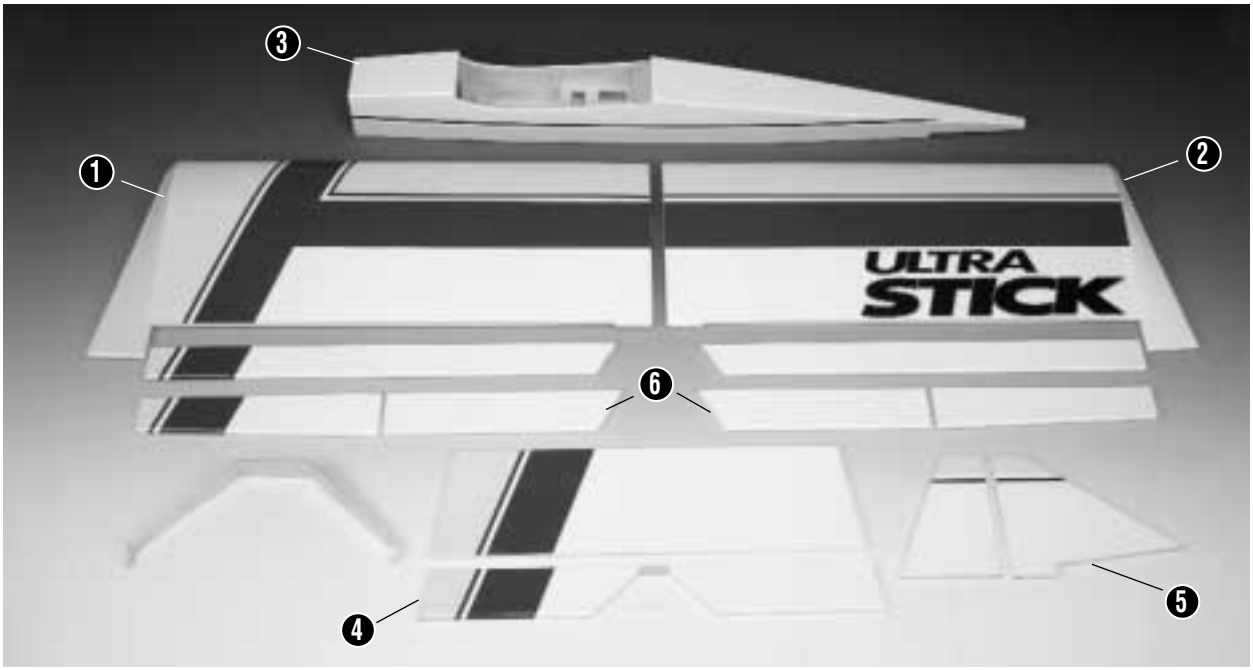
Other Equipment

Radio packing foam
Antenna tube
Mixing sticks
Medium sandpaper
Paper towels
Wax paper
Rubbing alcohol
Felt-tipped pen/pencil
Toothpicks (optional)
White Goldberg Ultracote® (GBG870)

Kit Contents

Large Parts

1. Left Wing Panel w/Aileron (HAN1677)
2. Right Wing Panel w/Aileron (HAN1677)
3. Fuselage (HAN1676)
4. Horizontal Stabilizer and Elevator (HAN1678)
5. Vertical Stabilizer and Rudder (HAN1678)
6. Optional Flap/Aileron Parts (for quad flap wing, included) (HAN1679)



Note: Photo of product may vary slightly from contents in box.

Small Parts (not shown)

Landing Gear (HAN1680)
Wheels 2 1/2"
Engine Mount w/Hardware (HAN40M)
Pushrods
Fuel Tank 8 oz
Tail Wheel Assembly
Tail Wheel
Nylon 2-56 Clevis
Nylon Control Horns
Main Wheel Axles

Section 1: Assembling the Wing

Conventional Aileron

Parts Needed	Tools and Adhesives Needed	
• Right wing panel with aileron and hinges • Left wing panel with aileron and hinges	• Instant thin CA glue • CA remover/debonder • Paper towels • T-pins (one for each hinge) • Sealing iron	• White Goldberg UltraCote® • Hobby knife w/#11 blade • Straight edge • Ruler

Before construction begins, decide what style of wing is desired (conventional or quad flap) and what type of engine will be mounted on the model. The conventional aileron wing will be presented in this section. Each aileron will be controlled by its own servo. You will need two servos when you begin Section 3.

For a standard wing configuration, we recommend a servo that has 40 oz/in of torque or greater, such as the JR 537 servo that now comes standard with JR radio systems. The JR 531 or JR 8101 are also excellent servos to use for aileron servos in the wing.

Step 1. Carefully remove one of the wing panels from its protective plastic. Save the plastic, as it will be used later in Section 2 to protect the wing panel surface from epoxy smears. Remove the aileron from the wing panel.

Step 2. Locate the hinges included and place a T-pin in the center's outside edge of each hinge. Slide a hinge into the hinge slot of each wing panel until the T-pin is snug against the wing.

Step 3. Slide the aileron onto the wing until there is only a slight gap. The hinge is now centered on the wing panel and aileron. Remove the T-pin and snug the aileron against the wing panel. This will ensure that the hinges are centered.

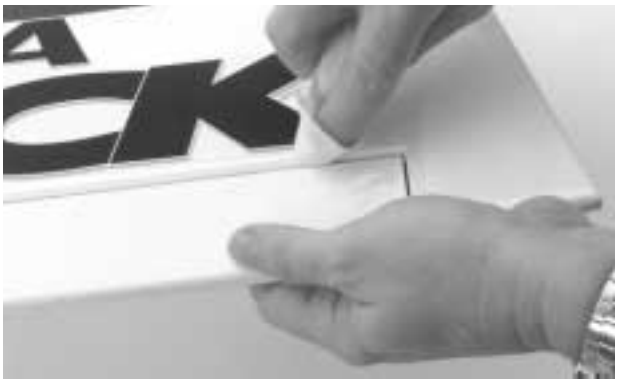
Step 4. Deflect the aileron and completely saturate the hinge with thin CA glue. The aileron's front surface should lightly contact the wing during this procedure. Ideally, when the hinge is glued in place, a 1/ 32 " gap or less will be maintained throughout the length of the aileron. The hinge is constructed of a special material that allows the CA to wick or penetrate and distribute throughout the hinge, securely bonding it to the wood structure.

Section 1: Assembling the Wing

CONTINUED

Step 5. Turn the wing panel over and deflect the aileron in the opposite direction from the opposite side. Apply thin CA glue to each aileron hinge, making sure the CA penetrates into both the aileron and the wing.

Step 6. Using CA remover/debonder and a paper towel, remove any excess CA glue that may have accumulated on the wing or in the aileron hinge area.



Step 7. Repeat this process with the other wing panel, securely hinging the aileron in place.

Step 8. After both ailerons are securely hinged, firmly grasp the wing and aileron to check that the hinges are securely glued and cannot be pulled apart. To do this, apply medium pressure while trying separating the aileron from the wing, using caution to be certain you don't crush the wing structure. Move the aileron up and down several times to "work in" the hinges and check for proper movement.

Section 1: Assembling the Wing

CONTINUED

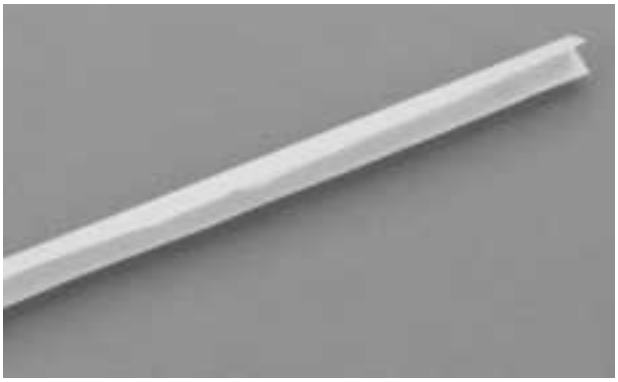
Sealing the Hinge Gaps

Although not mandatory, it is always a good practice to seal the hinge gap of the aileron control surfaces. Sealing the hinge line has several advantages. A sealed hinge line gives a greater control response for a given control deflection. It also offers more precise, consistent control response and makes trimming the aircraft during flight easier.

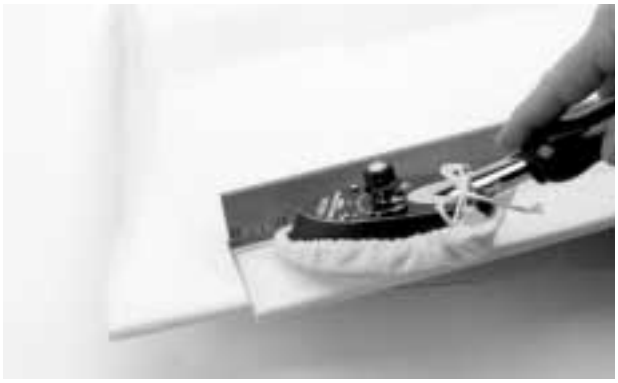
Step 9. To seal the aileron hinge line, cut a piece of Clear (GBG887) or White Goldberg UltraCote® (GBG870, not included) approximately 3" wide by the length of your hinge line. Fold the UltraCote® down the center with the adhesive side to the outside making a sharp crease at the fold line.

Step 10. Measure 3/8" from the folded crease out. Make several marks along the length of the folded covering.

Step 11. With the piece of covering still folded, use a hobby knife with a sharp #11 blade and a straight edge to carefully cut the entire length of the covering at the marks you made in the previous step.



Step 12. Remove the backing from the covering. Place the folded crease into the center of the hinge line on the bottom of the wing. Using a straight edge, hold one side of the covering in place while ironing down the opposite side with a sealing iron.



Step 13. Fully deflect the aileron in the up position. Place the straight edge over the hinge line covering what you just ironed down. With the straight edge placed firmly at the bottom of the hinge line, iron down the covering while making sure the aileron is fully deflected.

Section 1a: Assembling the Wing

Quad Flap Wing

Parts Needed	Tools and Adhesives Needed	
• Right wing panel with aileron and hinges • Left wing panel with aileron and hinges • Right wing aileron/flap • Left wing aileron/flap	• Instant thin CA glue • CA remover/debonder • Paper towels • T-pins (one for each hinge)	• Sealing iron • White Goldberg UltraCote® • Hobby Knife w/#11 blade • Straight edge • Ruler

Note: The procedure for hinging the flap/aileron in each wing panel is the same as described for the conventional wing.

Step 1a. Locate the plastic bag containing the flap/aileron pieces for each wing panel and remove from the package. Carefully remove one of the wing panels from the protective plastic bag. Save the plastic bag for use in Section 2. Remove the conventional aileron from the wing panel.

Step 2a. The Ultra Stick 40 comes with high-quality CA type hinges. Locate the CA hinges included and place a T-pin into the outside edge of each hinge. Be sure the hinge remains centered while installed into the control surface. Slide a hinge (with T-pin) into the flap control surface, and then do the same for the aileron control surface. When you're satisfied each hinge is centered, proceed to the next step.

Step 3a. Slide the aileron and flap control surface onto the wing panel until there's only a slight gap (approximately 1/32"). The hinges are now centered on the wing panel and the control surfaces. Remove the T-pins and snug each control surface to the wing panel. This will ensure the hinges are centered. Make one more up-and-down movement of each control surface to make sure there is no binding to the wing panel or to each control surface.

Note: Before applying CA, make sure the flap and aileron move freely without binding on the wing or with each other.

Step 4a. Deflect the aileron and/or flap and completely saturate each hinge with thin CA glue. The front control surface should lightly contact the wing during this procedure. The hinge is made of a special material that allows the CA to penetrate and distribute throughout the hinge, securely bonding it to the wood structure.

Step 5a. Turn the wing panel over and deflect the aileron and/or flap in the opposite direction. Apply thin CA to each hinge, making sure the CA penetrates into both the control surface and the wing.

Section 1a: Assembling the Wing

CONTINUED

Step 6a. Using CA remover/debonder and a paper towel, remove any excess CA glue that may have accumulated on the wing or the aileron.

Step 7a. Repeat Steps 4a through 6a for the flap control surface.

Step 8a. After both the aileron and flap control surfaces are securely hinged, firmly grasp the wing and check to make sure the flap and aileron are hinged securely to the wing by seeing if they can be pulled out from the wing. Use medium pressure and exercise caution to make certain that you don't crush the wing structure.

Note: Move the flap and aileron control surfaces up and down several times to "work in" the hinges and check for proper movement.

Step 9a. Repeat this process for the other wing panel, securely hinging the flap and aileron in place.

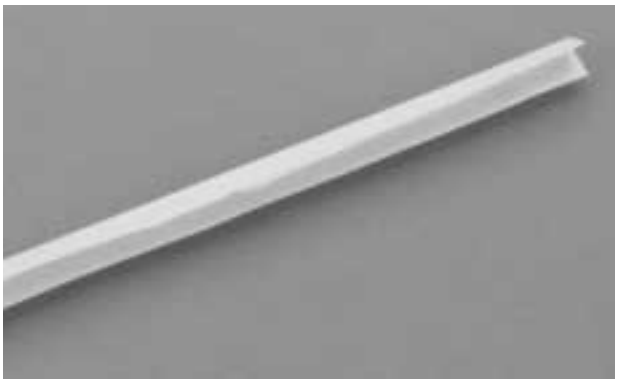
Step 10a. To seal the aileron and flap hinge line, cut a piece of White UltraCote® (GBG870, not included) approximately 3" wide to the length of each hinge line. Fold the covering down the center with the adhesive side to the outside, making a sharp crease at the fold line.

Step 11a. Measure 3/8" at the folded crease out. Make several marks along the length of the folded covering.

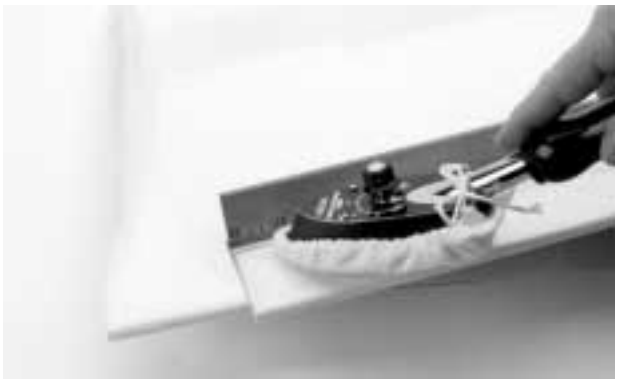
Section 1a: Assembling the Wing

CONTINUED

Step 12a. With the piece of covering still folded, use a hobby knife with a sharp #11 blade and a straight edge to carefully cut the entire length of the covering at the marks you made in the previous step.



Step 13a. Remove the backing from the covering. Place the folded crease into the center of the hinge line on the bottom of the wing. Using a straight edge, hold one side of the covering in place while ironing down the opposite side with a sealing iron.



Step 14a. Fully deflect the aileron and/or flap in the up position. Place the straight edge over the hinge line covering that you just ironed down. With the straight edge placed firmly at the bottom of the hinge line, iron down the covering while making sure the aileron and/or flap are fully deflected.

Section 2: Joining the Wing Halves

Parts Needed	Tools and Adhesives Needed	
• Right/left wing panels	• 30-minute epoxy	• Rubbing alcohol
• Plastic wing bags (optional)	• Epoxy brush	• Paper towels
• Wing joiner brace	• Mixing stick	• Wax paper
	• T-pin	• Ruler
	• Masking tape	• Pencil
	• Hobby knife	

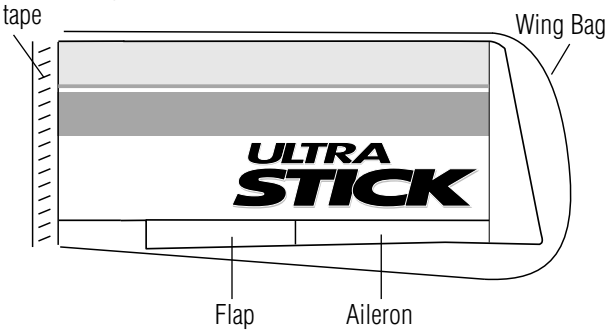
Step 1. Locate the wing joiner. Using a ruler, determine the center of the brace and mark it with a pencil.

Step 2. Trial fit the wing joiner into one of the wing panels. It should insert smoothly up to the center line marked in Step 1. Now slide the other wing panel onto the wing joiner until the wing panels meet. If the fit is overly tight, it may be necessary to sand the wing joiner.

Step 3. The Ultra Stick 40™ is designed with "0" dihedral. Place the wing on a large flat surface. The thickest section of the wing should be flat on the work surface.

Step 4. Separate the wing halves and remove the wing joiner. Once you're satisfied with the trial fit of the wing panels, you can prepare to epoxy the wing panels together.

Note: Use the plastic wing bags as a means of keeping epoxy from smearing on the wings. Just slip one on each panel and use masking tape to hold them in place.



Important: Read through each of the remaining steps of this section before proceeding to epoxy the wing halves together.

Step 5. Mix approximately 1 ounce of 30-minute epoxy.

Note: It's extremely important to use plenty of epoxy when gluing the wing halves together.

Section 2: Joining the Wing Halves

CONTINUED

Step 6. Place one wing half right-side-up on a flat work surface.

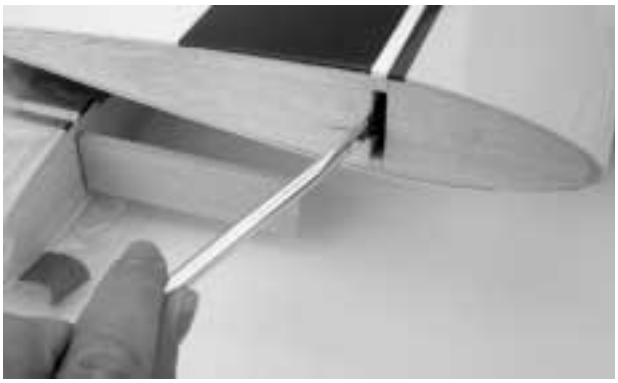
Note: Use wax paper underneath the wing center while the epoxy is curing. With the wing lying flat on a surface without any dihedral, apply more masking tape to the wing center joint and recheck that the wing remains flat. Also make sure the wing halves are properly aligned. Allow the wing joint epoxy to cure completely (overnight).

Using an epoxy brush, smear a generous amount of epoxy into the wing joiner cavity in the wing panel.

Step 7. Coat one half of the wing joiner with epoxy on both sides, up to the pencil line drawn in Step 1. Install the epoxy-coated half of the wing joiner into the wing joiner cavity of the wing panel up to the marked center line. Any spilled or excess epoxy can be cleaned up with rubbing alcohol and paper towels.

Note: Mix an additional 1-2 ounces of epoxy to complete the wing joining process.

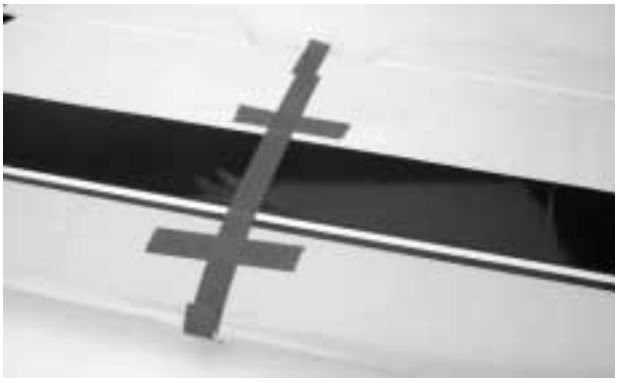
Step 8. Apply a generous amount of epoxy into the wing joiner cavity of the other wing panel.



Step 9. Install a T-pin into the wing joiner at the center mark. Next, apply epoxy to all sides of the exposed area of the wing joiner and uniformly coat both wing roots with epoxy.

Step 10. Carefully slide the two wing halves together and firmly press, allowing the excess epoxy to run out. Make sure the wing panels align properly. Wipe any excess epoxy away with rubbing alcohol and paper towels. The plastic wing bag can be removed from the wing halves after the epoxy has been applied.

Step 11. Apply masking tape at the wing joint to hold the wing halves together securely. Place the wing right-side-up on a flat surface.



Step 12. Allow the wing center joint to cure completely, then remove the masking tape.

Section 3: Installing the Aileron/Flap Servos

Parts Needed	Tools and Adhesives Needed
• Assembled wing • Standard servos with mounting hardware (2) (4 for quad/flap configuration) **Note:** The flap servo must be reversed if using a Y-harness for flaps • Servo extension -12" (2) (4 for quad-flap configuration wing)	• Hobby knife • Medium Phillips screwdriver • Drill • Drill Bit: 1/16" • Masking tape • Pencil • String with weight on end • Needle-nose pliers

Step 1. Locate the servo openings in the bottom of the wing. Use a sharp hobby knife to trim away the covering over the openings. If building the conventional wing, you will only cut out the openings that are closest to the wing root for the aileron servos. If you build the quad flap wing, trim away the covering on all four servo openings in the wing. Use care not to cut away too much of the covering.

Step 2. Install the recommended servo hardware supplied with your radio system onto your servos (grommets and eyelets). Install a servo extension lead to the servo as well. Secure the connectors with either masking tape or a commercial connector that prevents the servo lead connections from becoming disconnected.

Hint: It's always a good idea to secure the servo connectors and servo extension together to prevent the wires from becoming unplugged inside the wing. Tape works well for this.

Step 3. Trial fit the servo into the servo opening. Depending upon the type of servo installed, some trimming may be required. Note that the servo is orientated so the servo arm is closer to the trailing edge of the wing.

Step 4. With the servo in place, mark the location of the servo screws and then remove the servo.

Step 5. Using a 1/16" drill bit, drill the servo screw locations marked in Step 4.

Step 6. Repeat the procedure for the other servo(s). Proceed to Step 7 before permantly securing the servos in the wing.

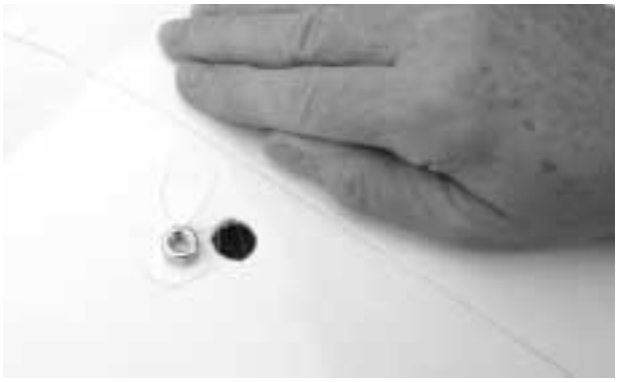
Section 3: Installing Aileron/Flap Servos

CONTINUED

Step 7. Before mounting the servos in the wing, it's suggested the servo extensions be run through the wing and out the opening near the root rib.

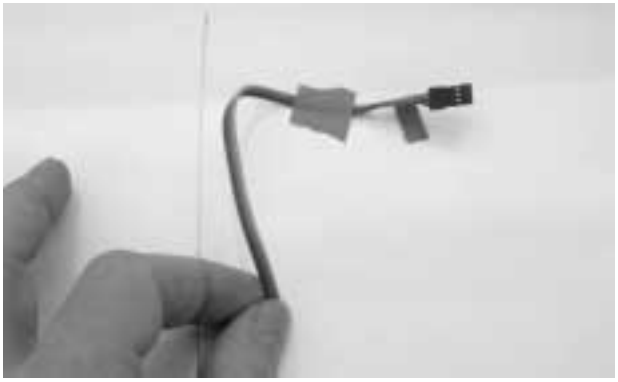
Step 8. Locate the two servo lead exits (oval-shaped) near the center of the wing bottom. Using a sharp hobby knife, trim away the covering to expose the openings, making sure to use caution so you don't cut into the wing sheeting.

Step 9. To thread the servo lead extensions/servo leads through the wing, we suggest using a 24" piece of string with a weight attached (such as one of the wheel collars in the kit). Thread it down the servo lead opening at the root center of the wing to the servo openings in the wing.



Step 10. Once the string is threaded though the wing, you can get it out by reaching in the hole with needle nose pliers or let the weight drop out of the opening by turning the wing right side up. Tape each end to the wing to keep it from falling back into the opening. When you're ready to thread the servo extension and servo lead through the wing, simply tie the string to the extension and carefully thread them through the wing by pulling the string/lead through the openings.

Step 11. Tape the lead to the wing to keep it from falling back into the opening. It may be easier if you thread one servo lead at a time.



Step 12. Securely fasten the servo in the opening with four of the servo mounting screws supplied with your radio system. We suggest you mark which lead is an aileron lead and which is a flap lead. Apply masking tape to the appropriate lead and mark either "F" for flap or "A" for aileron.

Step 13. Repeat the procedure for the other servo(s).

Note: It is intended to have each servo connected to a specific channel in the receiver. However, you can use a Y-harness to connect two ailerons to one aileron channel or two flaps to one flap channel, which will require one of the flap servos to be reversed. This will reduce your programming but also greatly reduce the Ultra Stick™ 40's performance capability. Please refer to Section 19 for computer radio programming for the Ultra Stick 40.

Installing the linkages and control horns to the ailerons/flaps will be addressed later in the manual.

Section 4: Bolting the Wing to the Fuselage

Parts Needed	Tools and Adhesives Needed	
• Fuselage	• Drill	• Felt-tipped pen/pencil
• Wing	• Drill Bit: 1/4"	• Ruler (36" or tape measure)
• Leading edge wing dowels	• Hobby knife	• 6-minute epoxy
• Wing-bolt plate	• Round file	• Rubbing alcohol
• Wing bolts	• Flat screwdriver	• Paper towels

Note: Your Hangar 9™ Ultra Stick™ 40 comes from the factory with two predrilled holes in the leading edge of the wing for the alignment dowels. You will have to drill out the two bolt holes in the trailing edge of the wing. First install the leading edge dowels, drill the wing bolt holes in the trailing edge, and then install the wing bolt plate.

Step 1. Locate the predrilled leading edge dowel holes located on both sides of the center joint of the wing. Carefully remove the covering from the holes with a hobby knife.

Step 2. Trial fit the leading edge wing dowels into the holes. There should be approximately 1/2" of dowel protruding from the leading edge of the wing. After inserting the dowels, mark each dowel at the leading edge of wing.

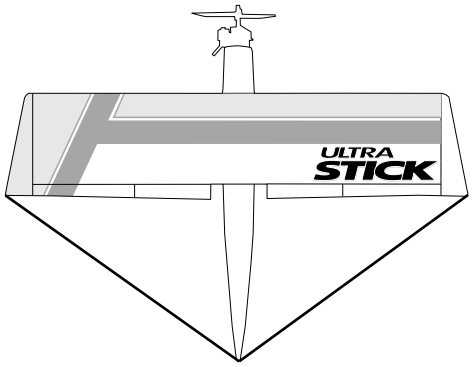
Step 3. Remove the dowels and mix 6-minute epoxy. Use a generous amount of epoxy in the leading edge holes and on the portion of the dowels that will be inserted into the wing. Insert dowels into the wing to the marks you previously made on the dowels and wipe off any excess epoxy. Be sure to allow epoxy to dry thoroughly before proceeding to the next step.

Step 4. After the epoxy has cured, trial fit the wing to the fuselage by inserting the leading edge dowels into the former in front of the wing saddle of fuselage. If wing dowel fit is too tight in the fuselage former, carefully enlarge the holes using a round file in the former just enough to get the wing dowels inserted.

Section 4: Bolting the Wing to the Fuselage

CONTINUED

Step 5. With the wing centered check the alignment by measuring from each wing tip to the rear of the fuselage. Be sure to use the same point on each wing tip exactly the same distance on each side from the center of the wing. Refer to the figure below.

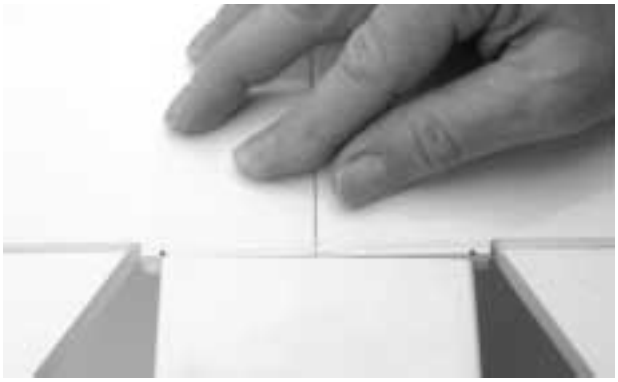


Step 6. With the wing centered and aligned to the fuselage, mark the wing exactly in line with the sides of the fuselage.

Step 7. Remove the wing from the fuselage. You will use the wing bolts installed through the bottom of the wing bolt blind nuts to mark the location for the wing on the fuselage. In the fuselage, locate the wing bolt block with the preinstalled blind nuts. Partially thread the wing bolts through the blind nuts from the bottom up until the wing bolts are just slightly above the wing saddle.

Step 8. Carefully install the wing back onto the fuselage without touching the wing bolts.

Step 9. With the leading edge dowels of the wing installed in the fuselage, hold the trailing edge just above the upside down wing bolts in the fuselage. Hold the trailing edge over the bolts, aligning the center of the wing over the marks you previously made on the wing. Carefully lower the trailing edge of the wing until it contacts the wing bolts. Gently press down on the trailing edge, to make indents on the bottom of the wing, marking where to drill for the wing bolts.



Step 10. Remove the wing and the wing bolts from the fuselage. Note the indents on the bottom of the wing.

Section 4: Bolting the Wing to the Fuselage

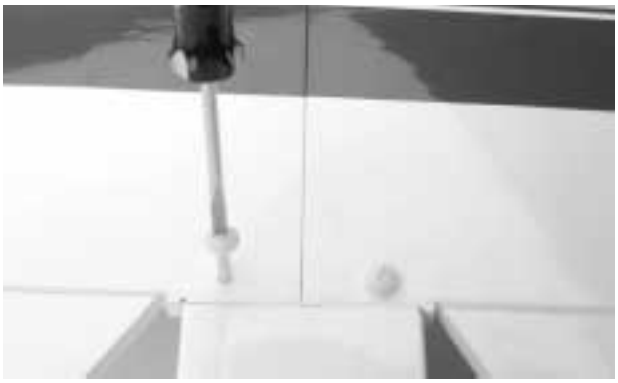
CONTINUED

Step 11. Using a 1/4" drill bit, carefully drill through the wing at the indents in the bottom of the wing. Be careful when the drill bit exits the top of the wing that you do not tear the covering.

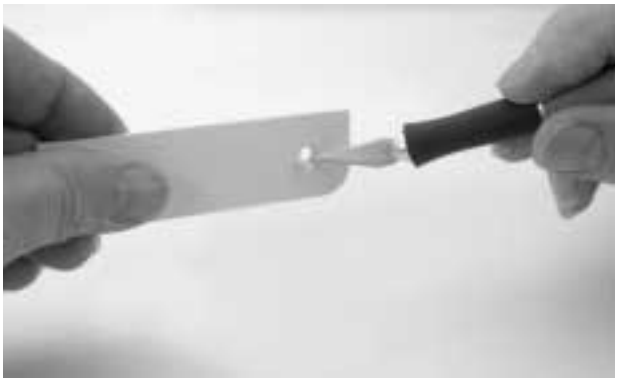
Note: When you drill the wing bolt holes, be sure to drill the holes perpendicular to the top surface of the wing.

Step 12. After you have drilled the wing for the wing bolts, trial fit the wing into position on the fuselage. Carefully thread each bolt just a few turns into the installed blind nuts in the fuselage.

Note: If the wing bolt holes are not perfectly aligned and you can't get the bolts to thread into the blind nuts, carefully use a round file and enlarge the hole in the wing. It only requires that a small amount of material be removed. The wing bolts may be hard to turn when you first install them but will get easier in time. Be careful not to cross-thread the bolts into the blind nuts. Remove the wing bolts.



Step 13. Locate the wing bolt hold-down plate. Note the wing bolt hold-down plate has holes already drilled for the wing bolts. The holes in the wing bolt plate have the same spacing as the preinstalled blind nuts in the fuselage. Carefully remove the covering over the predrilled openings using a sharp hobby knife.

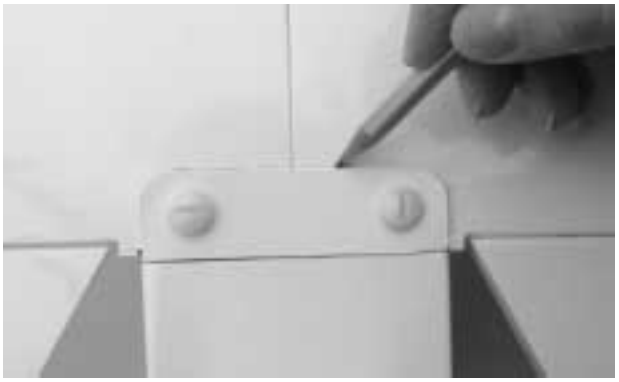


Step 14. Insert the wing bolts through the wing bolt plate (covered side up) and insert the bolts through the wing bolt holes in the wing.

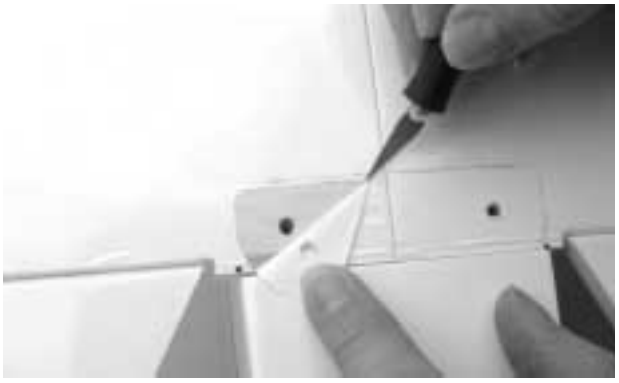
Section 4: Bolting the Wing to the Fuselage

CONTINUED

Step 15. Install the wing back onto the fuselage and gently snug the wing bolts, securing the wing to the fuselage. Mark the wing bolt plate location on top of the wing. Remove the wing bolts and plate from the wing.



Step 16. Using a hobby knife, carefully trim away the covering on the wing just inside the lines you marked for the wing bolt plate. Be sure to avoid cutting into the balsa wood.



Step 17. Mix approximately 1/4 ounce of 6-minute epoxy and glue the wing hold-down plate onto the wing. Wipe off any excess epoxy and remove any epoxy from the wing bolt holes. Allow the epoxy to completely cure before proceeding.

Section 5: Installing the Horizontal Stabilizer

Parts Needed	Tools and Adhesives Needed	
• Horizontal stabilizer	• Hobby knife	• Paper towels
• Fuselage	• Ruler	• Rubbing alcohol
• Assembled wing	• Felt-tipped pen	• Mixing stick
	• Pencil	• Epoxy brush
	• 30-minute epoxy	• Masking tape

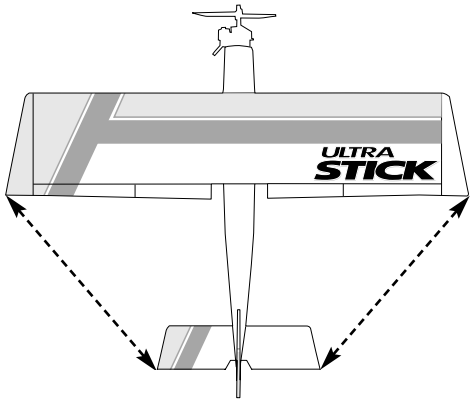
Note: Before assembling the tail, be sure the elevator and the CA hinges are removed from the horizontal stabilizer. The hinges and elevator will be installed later.

Step 1. Measure and mark the center of the horizontal stabilizer at its leading and trailing edges.

Step 2. Install the wing onto the fuselage.

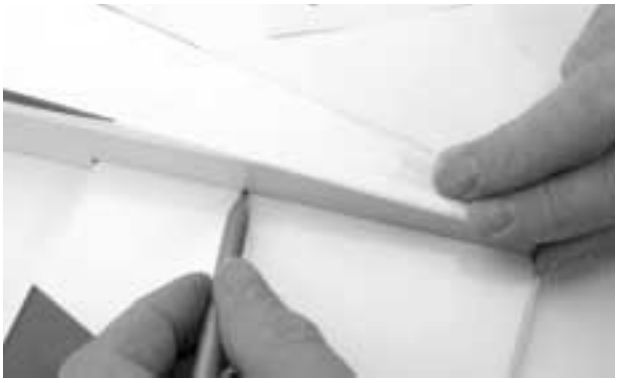
Step 3. On the bottom of the aft end of the fuselage is a saddle cut-out for the horizontal stabilizer to be mounted. Make a center mark on the front of the saddle on the fuselage and place the horizontal stabilizer into the horizontal stabilizer saddle. Align the two marks you just made. Tape the leading edge and trailing edge of the horizontal stabilizer to the fuselage to secure it for now.

Step 4. With the fuselage and horizontal stabilizer resting on a flat surface, align the horizontal stabilizer by measuring from fixed points on the wing to the outside of the trailing edge tip of the horizontal stabilizer. Be sure that the trailing edge of the horizontal stabilizer stays on its center mark.



Step 5. Adjust the stabilizer until you have an equal distance on both the right and left sides of the stabilizer to the wing.

Step 6. When you're satisfied with the alignment of the horizontal stabilizer with the wing, carefully mark the position with a pencil at the junction where the horizontal stabilizer meets the fuselage.



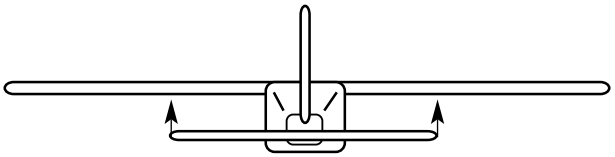
Step 7. Remove the horizontal stabilizer from the fuselage. Using a hobby knife and a straight edge, carefully cut the covering approximately 1/16 " inside the lines you drew.

Caution: It's very important that you do not press hard enough to cut into the wood structure, as doing so could weaken the horizontal stabilizer.

Section 5: Installing the Horizontal Stabilizer

CONTINUED

Step 8. With the fuselage and horizontal stabilizer together on a flat surface, check to be sure the wing and horizontal stabilizer are parallel with each other. If adjustment to the horizontal stabilizer saddle is necessary because the wing and stabilizer are not parallel, carefully sand the horizontal stabilizer saddle to adjust as necessary. Be absolutely sure that the fuse and stabilizer are on a flat surface and the wing is installed correctly before removing any material from the saddle area.



Step 9. Mix approximately 1/2 ounce (minimum) of 30-minute epoxy to install the horizontal stabilizer to the fuselage. Using an epoxy brush or mixing stick, spread the epoxy onto the top of the horizontal stabilizer where it comes into contact with the fuselage. Also, coat the stabilizer saddle area that will come in contact with the horizontal stabilizer.

Step 10. Lay the horizontal stabilizer onto a flat surface and position the fuselage onto it, making sure it's centered and aligned as in Steps 3 and 4.

Hint: Reference the bare wood you just exposed to re-align the stabilizer.

Place a heavy object (one that won't damage the fuselage structure) on top of the fuselage to press the stabilizer and fuselage together.

Note: Be sure that the horizontal stabilizer and fuselage are assembled on a firm, flat surface and that they are level with each other.

Step 11. Wipe off any excess epoxy using a paper towel and rubbing alcohol. Allow the epoxy to cure fully before proceeding to the next step.

Section 6: Installing the Vertical Stabilizer (Fin)

Parts Needed	Tools and Adhesives Needed	
• Vertical stabilizer with rudder • Fuselage	• 30-minute epoxy • Hobby knife • Pencil • Masking tape • Rubbing alcohol	• Paper towels • 90-degree triangle • Epoxy brush • Mixing stick

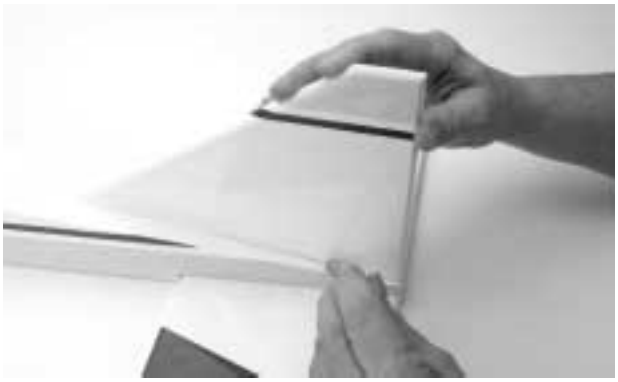
Step 1. On the rear of the fuselage, a slot is precut in the wood structure for the vertical stabilizer. Using a sharp hobby knife cut away the covering on the top rear of the fuselage where the vertical stabilizer inserts into the fuselage.

Step 2. Remove the rudder from the vertical stabilizer if you have not done so already. The rudder will be attached (hinged) to the vertical stabilizer later.

Step 3. Insert the vertical stabilizer into the slot in the top of the fuselage and make sure it's firmly seated down against the horizontal stabilizer. Make sure the rear of the vertical stabilizer (where the hinge slots are located) is aligned with the rear of the fuselage.

Note: The elevator should not be hinged to the horizontal stabilizer at this time. It will be attached later.

Step 4. Use a pencil to carefully mark the position of the vertical stabilizer on both sides where it exits the fuselage. The pencil should leave a slight indentation in the covering.



Step 5. Remove the vertical stabilizer and carefully cut away the covering with a sharp hobby knife just inside the lines you marked in Step 4.

Caution: Do not cut into the wood of the vertical stabilizer when cutting the covering, as doing so can weaken the structure.

Section 6: Installing the Vertical Stabilizer (Fin)

CONTINUED

Step 6. Mix approximately 1/4 ounce (minimum) of 30-minute epoxy and apply it to the vertical stabilizer where it comes into contact with the fuselage. Also apply epoxy to the base of the vertical stabilizer where it comes in contact with the horizontal stabilizer.

Important: It is essential that the vertical stabilizer base be epoxied to the horizontal stabilizer inside the fuselage to provide adequate strength. Be sure to use plenty of epoxy.

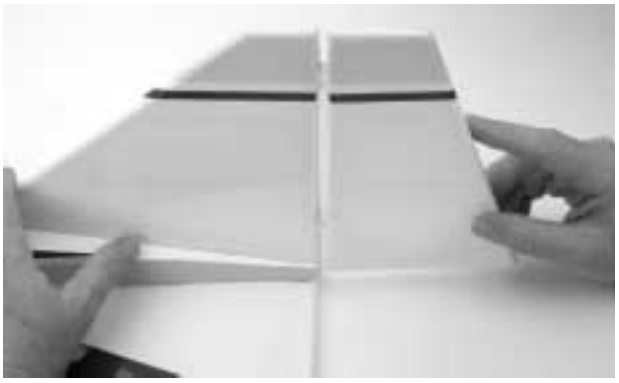
Step 7. Insert the fin into the fuselage and wipe away any excess epoxy using a paper towel and rubbing alcohol.

Step 8. Using a 90-degree triangle, make sure the fin is perpendicular to the horizontal stabilizer. Use masking tape to hold the vertical stabilizer in place until the epoxy cures.

Section 7: Installing the Rudder and Tail Wheel Assembly

Parts Needed	Tools and Adhesives Needed	
• Fuselage	• Drill	• Paper towels
• Rudder	• Drill Bits: 3/32 ", 1/16 "	• 30-minute epoxy
• Hinges	• Hobby knife	• Rubbing alcohol
• Tail wheel assembly	• Felt-tipped pen	• Mixing stick
• Tail wheel	• Toothpicks (optional)	• Threadlock Z-42
• Tail wheel collar	• Thin CA glue	• Petroleum jelly or oil
	• CA remover/debonder	• Masking tape

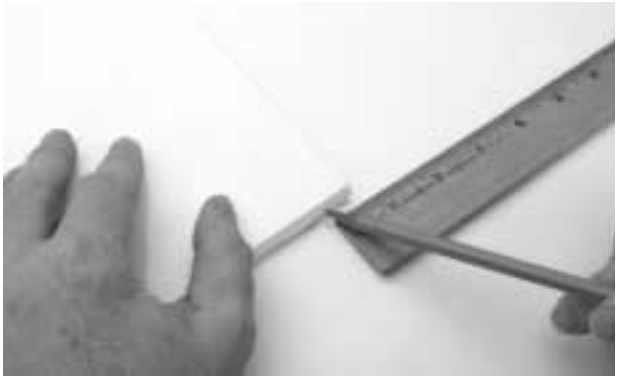
Step 1. Trial fit the rudder in position on the vertical stabilizer. Insert the hinges into the pre-cut slots of the rudder (do **not** glue at this time) and install the rudder onto the vertical stabilizer.



Step 2. Locate the tail wheel assembly. It includes the tail wheel wire, tail wheel, plastic bushing, wheel collar, and screw.

NOTE: Parts shown may very from what is included.

Step 3. The tail wheel's guide wire will be installed into the rudder. Mark the position where the hole is to be drilled into the leading edge of the rudder for the tail wheel guide wire. Also mark the position of the slot where the pivot bushing will fit centered into the back of the fuselage.



Step 4. Remove the rudder. Using a 3/32" drill bit, drill into the exact center of the leading edge of the rudder to accept the tail wheel guide wire as shown.

Section 7: Installing the Rudder and Tail Wheel Assembly

CONTINUED

Step 5. Using a hobby knife, cut a slot or groove into the back of the fuselage as marked to accept the tail wheel pivot bushing in Step 3.

Note: When you attach the elevator, you'll have to cut a small groove so the bushing clears the elevator.

Step 6. Trial fit the tail wheel assembly and rudder in place. Deflect the rudder, making sure the tail wheel assembly turns freely with the rudder.

Step 7. When you're satisfied with the fit, remove the tail wheel assembly and rudder from the fuselage. Reinstall the hinges in the rudder using T-pins to make sure the hinges are centered as described in Section 1. You will CA the hinges to the vertical stabilizer **after** the next step.

Step 8. Apply petroleum jelly or oil to the music wire area of the tail wheel assembly, especially the pivot area, so it will not adhere to the epoxy.

Note: Do **not** apply to the music wire area that will go into the rudder. This part of the music wire will be epoxied into the rudder.

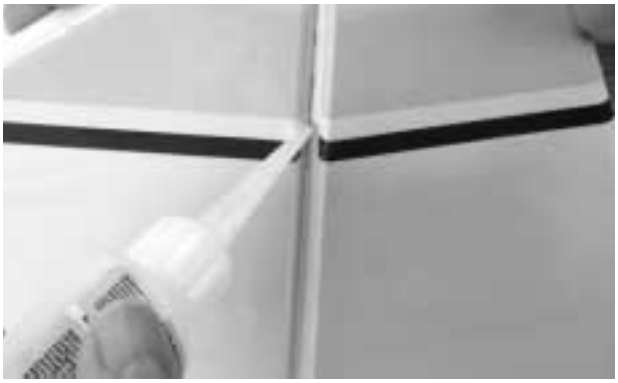
Section 7: Installing the Rudder and Tail Wheel Assembly

CONTINUED

Step 9. Mix approximately 1/4 ounce of 30-minute epoxy and apply it to both the pivot bushing where it goes into the fuselage and into the hole in the rudder you drilled in Step 4.

Hint: A toothpick applicator may be helpful in getting the epoxy into the holes.

Step 10. Reassemble the tail wheel assembly and the rudder onto the vertical stabilizer, making sure the rudder is aligned properly (up & down). Wipe away any excess epoxy with a paper towel and rubbing alcohol. Allow the epoxy to cure completely before attempting to hinge the rudder.



Step 11. With the rudder and tail wheel assembly installed, apply thin CA to the rudder hinges on both sides, using the same techniques outlined in Section 1. Be sure to remove the T-pins before applying the CA. There should be a minimal gap between the rudder and vertical stabilizer.

Step 12. Wipe away any excess CA with CA remover/debonder. After the hinges are dry, check to be sure they are securely in place by trying to pull the rudder from the vertical stabilizer. Use care not to crush the structure.

Step 13. Work the rudder left and right to make sure the movement is free and that the tail wheel assembly tracks accordingly.

Step 14. Slide the tail wheel itself onto the tail wheel wire. Next slide the wheel collar on the wire and tighten the screw in the wheel collar. Place a drop of threadlock on the screw to secure the collar in place.

Note: The tail wheel must rotate freely with only a small amount of side play.

It may be necessary to drill out the tail wheel slightly so the wheel will spin freely on the axle.

Section 8: Hinging the Horizontal Stabilizer and Elevator

Parts Needed	Tools and Adhesives Needed	
• Fuselage • Elevator • CA hinge	• Thin CA glue • CA remover/debonder • Paper towels • White Goldberg UltraCote®	• T-pins • Straight edge • Covering iron

Step 1. Locate the elevator and CA hinges. Hinge the elevator in the proper position on the horizontal stabilizer using the same hinging technique used in Section 1. Remember to remove the T-pins before applying the CA glue. Also, make sure the tail wheel is free to move its full range. You will also need to file a small notch in the elevator joiner to clear the tail wheel wire.

Step 2. With the elevator aligned (left and right), apply thin CA glue to the hinges on both sides. Wipe away any excess CA with CA remover/debonder and a paper towel.

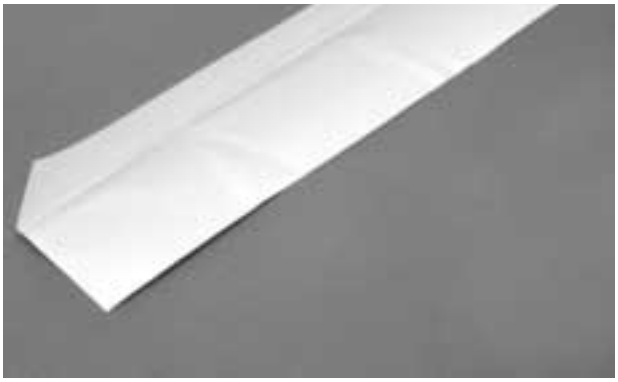
Step 3. After the hinges are dry, check to make sure they are securely in place. Try to pull the elevator from the horizontal stabilizer. Use care not to crush the structure.

Step 4. Flex the elevator up and down several times to "work-in" the hinges and check for proper movement.

Sealing the Hinge Gaps

It is always good practice to seal the hinge gap of the elevator. Sealing the hinge line has several advantages. A sealed hinge line gives a greater control response for a given control deflection. It also offers more precise, consistent control response and makes trimming the aircraft during flight easier.

Step 5. To seal the elevator hinge line, cut a piece of White Goldberg UltraCote® (GBG870) approximately 3" wide by the length of your hinge line. Fold the UltraCote® down the center with the adhesive side to the outside making a sharp crease at the fold line.



Section 8: Hinging the Horizontal Stabilizer and Elevator

CONTINUED

Step 6. Measure 3/8" for the folded crease out. Make several marks along the length of the folded covering.

Step 7. With the piece of covering still folded, use a hobby knife and a straight edge, carefully cut the entire length of the covering at the marks you made in the previous step.

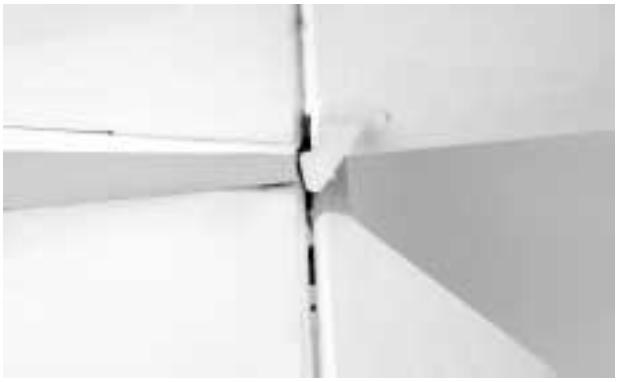
Step 8. Remove the backing from the covering. Place the folded crease into the center of the hinge line on the bottom of the horizontal stabilizer. Using a straight edge, hold one side of the covering in place while ironing down the opposite side with a sealing iron.

Step 9. Fully deflect the elevator in the up position. Place the straight edge over the hinge line covering what you just ironed down. With the straight edge placed firmly at the bottom of the hinge line, iron down the covering while making sure the elevator is fully deflected.

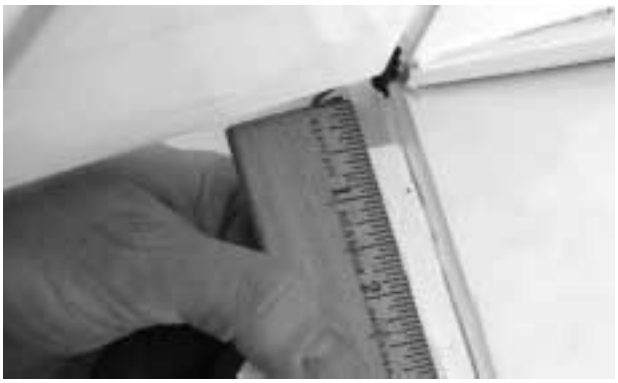
Section 9: Installing the Rudder and Elevator Control Horns

Parts Needed	Tools and Adhesives Needed
• Control horns (2) • Control horn backplates (2) • Control horn screws (6) • Fuselage	• Drill • Drill Bit: 1/16" • Felt-tipped pen/pencil • Medium Phillips screwdriver • Ruler

Important: When installing the control horns, it's important that the holes in the control horns where the pushrod attaches are directly in line with the control surface hinge line.



Step 1. To locate the elevator control horn position, measure over 5/8" on the right side of the horizontal stabilizer along the fuselage. Mark the elevator with a felt-tipped pen or a pencil. This mark will be the center of the elevator control horn location.



Step 2. Place the center of the control horn on the elevator at the mark made in the previous step. Mark the hole positions of the control horn with a felt-tipped pen or pencil.

Step 3. Remove the control horn and drill 1/16" holes through the elevator as marked.

Step 4. Attach the elevator control horn using the hardware provided and secure in place. Do not overtighten.

Section 9: Installing the Rudder and Elevator Control Horns

CONTINUED

Step 5. Measure 3/4" from the top of the fuselage on the left side of the rudder. Mark the location with a felt-tipped pen or pencil. This mark will serve as the center for the rudder control horn.

Note: Be sure that this will place the horn so the screws are on either side of the tail wheel wire in the rudder. This will provide additional support to this area.

Step 6. Center the control horn over the mark you've just made. Make sure the horn is positioned over the hinge line, just like you did for the elevator. Using a felt-tipped pen or pencil, mark the mounting hole locations onto the rudder.

Step 7. Drill these holes with a 1/16" drill bit and install the rudder control horn using the screws and backplate provided.

Section 10: Installing the Main Landing Gear

Parts Needed		Tools and Adhesives Needed
• Main landing gear	• Wheel collar with screw (2)	• Phillips screwdriver
• Fuselage	• Wheels, 2 1/2" (2)	• Moto-tool with cut-off wheel
• Landing gear axles with lock nuts(2)	• Landing gear bolts (2)	• Threadlock

Step 1. Attach the axles to the aluminum landing gear using the lock nuts provided. Slide on the wheel. Use the wheel collar to hold the wheel on the axle.

Note: It is always a good idea to use threadlock on the wheel collar bolts to keep them from coming loose.

Note: You can use a Moto-tool to cut the extra length off the axle. Be very careful not to get the axle too hot during the cutting process or you may melt the wheel hub. Take it slowly.

Step 2. Locate the two predrilled mounting holes in the bottom of the fuselage for mounting the landing gear. The blind nuts are also preinstalled from inside the fuselage. If the covering is over the holes, use a sharp hobby knife and carefully remove the covering over the predrilled holes.

Step 3. Bolt the landing gear onto the fuselage with the included hardware. Take a bolt and washer and insert it through the aluminum landing gear. Thread the mounting bolts into the preinstalled blind nuts and securely tighten.

Note: It is a good idea to use threadlock on bolt/nuts.

Section 11: Assembling the Fuel Tank

Parts Needed	Tools and Adhesives Needed
• Metal tubes (2) • Clunk (fuel pickup) • Fuel pickup tubing • Fuel tank • Metal caps (2) • Rubber stopper • 3 mm screw	• Hobby knife • Medium screwdriver • Drill Bit: 1/16"

Step 1. Locate the tank parts.

Step 2. The holes you see in one end of the rubber stopper are not completely open. You will need to open the holes in the rubber stopper by "pushing" the tubes through or using a 1/16" drill bit. Insert the short tube into one of the holes in the stopper. This will be the fuel tank pickup tube that provides fuel to the engine. Take the other tube and insert it though a second hole in the rubber stopper. This will be your "vent" tube. Have both tubes extend out about 1/2" from the end of the stopper.

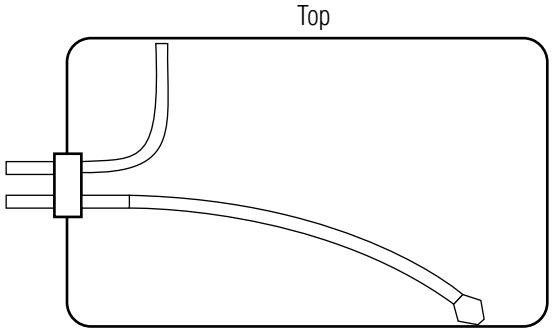
Step 3. Slide the smaller of the two caps over the tubes on the smaller end of the rubber stopper. The small end will be inserted into the fuel tank. The larger cap is placed on the other side of the rubber stopper which makes the cap.

Step 4. Insert the 3 mm screw into the center hole of the larger cap and then insert the cap and screw through the center hole in rubber stopper. Thread the screw onto the smaller inner cap and tighten it until it just threads into the smaller cap on the other side of the rubber stopper.

Section 11: Assembling the Fuel Tank

CONTINUED

Step 5. You will need to make a bend in one of the tubes to bend up inside to the top of the tank when the cap assembly is installed onto the fuel tank. Insert the cap assemble to the tank and see if the tube is near the top of the tank as shown below. If not, remove the cap assembly and bend tube until it reaches the top of the tank, but not touching it. Be careful not to "kink" the tube when bending.



Step 6. Locate the piece of clear silicone fuel tubing and metal clunk. This tubing will be used for the fuel pickup tube inside the fuel tank. Insert the clunk onto one end of the fuel tubing and install the other end onto the pick up tube of the fuel tank cap assembly.

Step 7. Carefully insert the assembly into the fuel tank. Note the position of the vent tube—it must be at the top portion of the fuel tank to function properly. Also, it may be necessary to shorten the length of the fuel pickup tubing and make sure the clunk does not rub against the back of the fuel tank. You should be able to turn the tank upside down and the clunk freely drops to the top of the tank. Refer to previous illustration.

Step 8. Tighten the 3 mm screw carefully—do not overtighten. This allows the rubber stopper to form a seal by being slightly compressed and thus sealing the fuel tank opening.

Important: Remember which tube is the vent and which is the fuel pickup. Once the tank is mounted inside the fuselage, it will be difficult to determine which is which. We have included two different color pieces of fuel tubing. We suggest using the red tubing for the fuel line to the carburetor of your engine and the green for the vent tube.

The fuel tank will be installed into the fuselage after the engine mount is installed.

Section 12: Installing the Throttle Pushrod Tube, Engine Mount, Engine, and Fuel Tank

Parts Needed	Tools and Adhesives Needed
• Fuselage • Hangar 9™ Universal .40-size Engine Mount w/Hardware • Engine • Assembled fuel tank • Protective foam (not included) • Throttle pushrod tube	• CA glue • Phillips Screwdriver or Hex wrench • Threadlock • 30-minute exopy

The firewall is fuel-proofed at the factory. If by chance you need to further fuel- proof the firewall or any other bare wood that is exposed, mix approximately 1/2 ounce of 30-minute epoxy with some rubbing alcohol (approximately 1/4 ounce) and brush it on the unprotected area to seal it from fuel. Allow the epoxy to cure completely.

Caution: Do not allow the epoxy to get into any of the predrilled holes.

Hint: Mixing the epoxy with rubbing alcohol will allow you to apply the epoxy easier and will speed up the drying time.

Step 1. Blind nuts are preinstalled to the back of the firewall to help insure the blind nuts do not come loose from the inside of the firewall when installing the engine mount bolts. Put a bead of CA around the outside flange of the blind nuts. Be careful not to get CA in the threads of the blind nuts.

Step 2. Locate the throttle pushrod. It is a 1.5-mm wire inside the shortest of the clear pushrod tube guides. Remove the throttle pushrod wire from inside the tube. Insert the throttle pushrod tube through the hole in the right side of the firewall furthest from the center of the firewall. Reach inside of the fuselage through the wing saddle and guide the throttle wire tube through the tube guide hole in the second former. Flush the end of the guide with the face of the firewall. Place a mark and cut the guide tube at the front edge of the servo tray installed in the fuselage. Reinstall the throttle pushrod tube into the fuselage and secure in place with CA at the second former. Be sure the tube is flush with the face of the firewall.

Step 3. Locate the Hangar 9 Universal Engine Mount and associated Hardware.

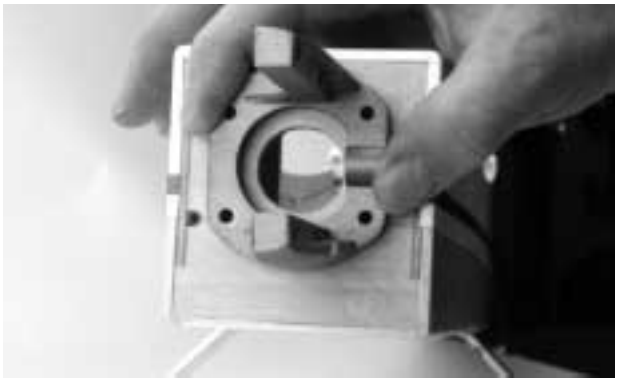
Section 12: Installing the Throttle Pushrod Tube, Engine Mount, Engine, and Fuel Tank

CONTINUED

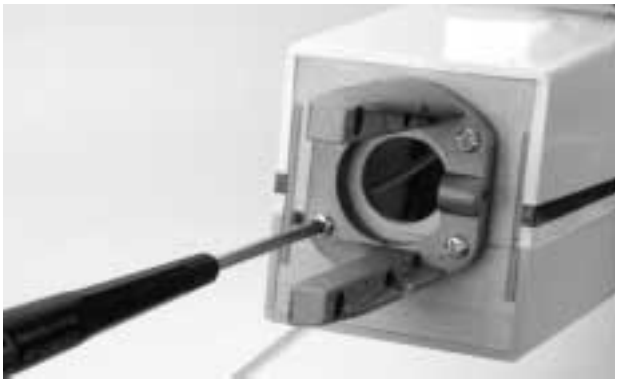
Step 4. The Hangar 9™ Engine mount fits nearly all .40–58 two-stroke engines and .50–72 four-stroke engines. Trial fit your engine into the engine mount.

Step 5. For engines that do not fit in between the beam mounting rails of the engine mount, use a moto-tool with drum sander or file and carefully remove equal amount of material off the inside of the mounting beams to just allow your engine to insert between the rails. Be careful not to remove too much material, as this could weaken the engine mount.

Step 6. Note the proper orientation of the engine mount to the firewall. The head of the engine will be to the right side of the airplane (as viewed from the aft end of the fuselage or from the pilots perspective when sitting in the cockpit).



Step 7. Secure the motor mount to the firewall by installing the four bolts through the engine mount bolt holes and into the pre-installed blind nuts in the firewall. It is a good idea to use threadlock on the mounting bolts before installing them through the engine mount and into the blind nuts.



Step 8. Before installing your engine onto the engine mount, insert the fuel tank into the fuselage. The two pieces of fuel tubing should exit through the center hole in the firewall. Use protected foam (not included) under and behind the fuel tank and/or around the fuel tank to secure it in place.

Section 12: Installing the Throttle Pushrod Tube, Engine Mount, Engine, and Fuel Tank

CONTINUED

Step 9. After you have the engine mount and fuel tank installed, turn the fuselage on its left side. Install your engine in between the engine beams and install the metal clamps and four bolts and nuts to hold the engine in place. Center the engine on the engine mount beams between the clamping bolts and tighten. Be sure the nuts are captured in the bottom of the engine mount.

Step 10. Install the fuel pick-up line to the carburetor. The fuel tank vent line will be installed onto your engine's muffler. The muffler is installed proceeding the completion of installing the throttle pushrod.

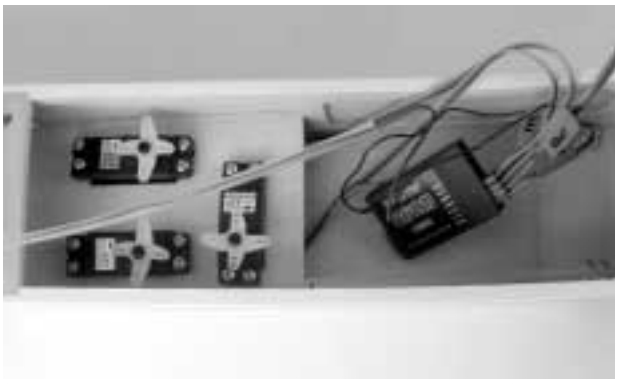
Section 13: Installing the Radio System

Parts Needed	Tools and Adhesives Needed
• Radio system with 5-7 servos and hardware (not included) • Fuselage • Radio packing foam (not included) • Antenna tube (optional, not included) • Y-harness (optional—must have if using 4-channel radio)	• Medium Phillips screwdriver • Hobby knife • Drill • Drill Bit: 1/16"

Step 1. Install the rubber grommets and eyelets in three servos. Position the servos in the fuselage servo tray as shown, noting the location of the servo horns. Before installing the servos in the servo tray, we suggest the servo leads be identified by using some masking tape with the appropriate letter to designate which servo it is, e.g., "T" = Throttle, "R" = Rudder, and "E" = Elevator. Screw the servos in place using the 12 servo screws included with the servos.

Step 2. Use radio packing foam (available at your local hobby shop) when you install the receiver and battery.

Step 3. Be sure to attach the servo leads to the receiver prior to installing the receiver into the fuselage (refer to Radio Set-Up section). Route the antenna back through the fuselage using an antenna tube (not included) or route it outside the fuselage back to the stabilizer. If using an antenna tube, lightly tape receiver antenna to the outside of tube and route antenna tube inside the aft section of the fuselage. Be sure to avoid the elevator and rudder linkages.



Section 13: Installing the Radio System

CONTINUED

Step 4. Wrap the receiver battery in foam and place it in the fuselage area forward of the servo tray and receiver. We suggest using layers of foam to hold the battery. Using a sharp hobby knife, cut a solid layer of foam the size of the compartment area that is in front of the servo tray. Cut another layer of foam that is identical in size with an opening in the center that is the size of the battery pack. Cut another layer of foam identical in size to the compartment and place it on top of the battery. Cut slits in the foam to allow the battery lead to exit the foam.

Step 5. The switch should be mounted on the left side of the fuselage, away from the exhaust of the engine.

Hint: Use the switch plate as a template.

Look inside the fuselage and pick a location to mount the switch in the opening of the fuselage side doubler. (Mount through just to the fuselage sheeting, not through the ply doubler.)

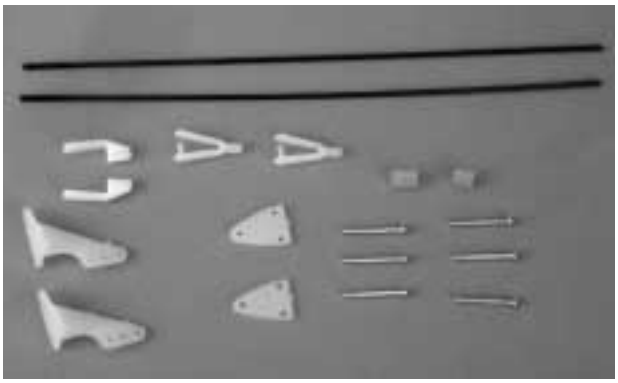
Step 6. Using a 1/16" drill bit, drill two mounting holes for the switch as marked. Using your hobby knife, carefully cut out the opening for the switch between the screw holes.

Step 7. Reposition the switch plate as shown and place the switch on the inside of the fuselage. Using the two screws supplied with the switch, attach the switch to the fuselage. Plug in the switch to receiver/receiver battery.

Section 14: Installing the Aileron and/or Quad Flap Linkages

Parts Needed	Tools and Adhesives Needed
• Wing assembly w/servos installed • Short rods, threaded on one end (2 for conventional wing, 4 for quad flaps) • Clevis (2 for conventional aileron, 4 for quad flaps) • Wire keepers (2 for conventional aileron, 4 for quad flaps) • Control horn (2 for conventional wing, 4 for quad flaps) • Control horn mounting screws • Clevis keepers (4 for conventional wing, 8 for quad flaps)	• Medium Phillips screwdriver • Drill • Drill Bit: 1/16" • Felt-tipped pen • Thin CA glue (optional)

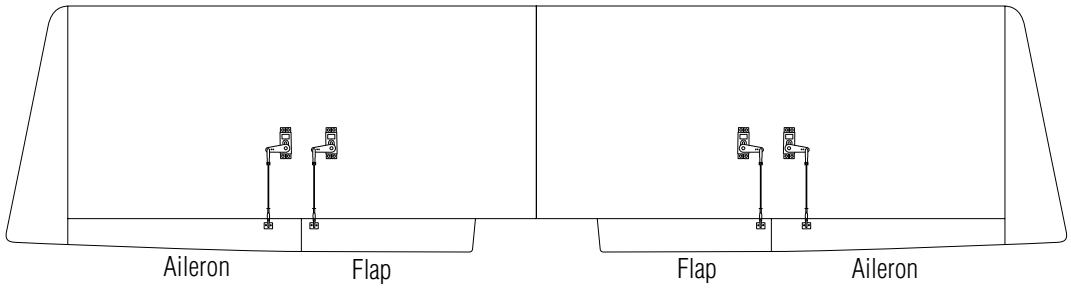
Step 1. Locate the short rods threaded on one end, clevis and wire keepers. You will also need a control horn, a control horn backplate, and mounting screws to mount the control horn to the control surface. Instructions will refer to construction of just one linkage and control horn. Assembly and installation for both ailerons and/or all four will follow this same sequence.



Step 2. Before assembly and mounting the linkages/control horns, it's a good idea to center the wing servos. Connect them to the receiver, turn on your transmitter, then the receiver. Once the servos have moved to their electrical center, you can position the servo control arm so that it will be approximately 90 degrees to the linkage when it's attached. Fine-tuning of the servo arm position can be done by adjusting the linkages in or out. It's important that the mechanical adjustments are made as closely as possible before attempting to make any electrical adjustments through the transmitter programs.

Important: The aileron/flaps servo arms should be positioned outboard toward the wing tips as shown below. Failure to do this can cause radio programming difficulties that will result in the flaps or ailerons moving in the wrong direction.

Note: If you are using a Y-harness to connect servos to receiver and if you are setting up a quad/flap configuration, refer to the radio set-up section of this manual for further instruction on position of the servo control arms.



Bottom View of Wing (Step 2)

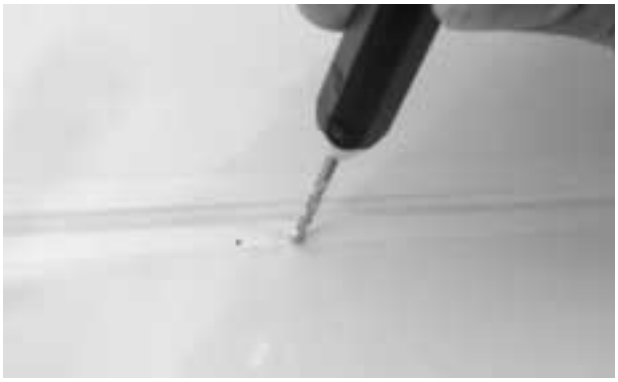
Section 14: Installing the Aileron and/or Quad Flap Linkages

CONTINUED

Step 3. The control horn should be positioned so the holes that the clevis connects onto are over the centerline of the hinge line of the control surface.

Once satisfied with the horn location (it should be a straight line from the servo arm to the horn), mark the location with a felt-tipped pen. You will note the servo is positioned at an angle to the wing, but is 90 degrees to the hinge line.

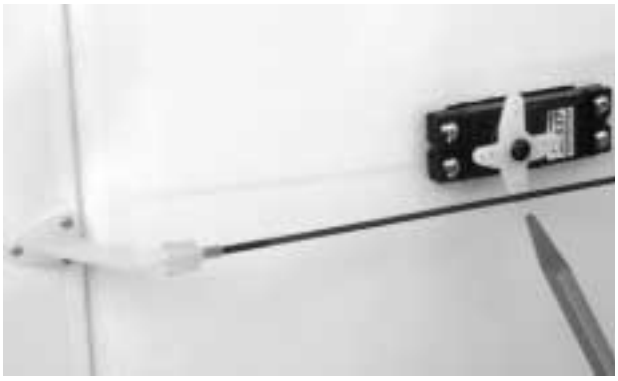
Step 4. Using a 1/16" drill bit, drill the screw holes for mounting the control horn.



Step 5. Attach the control horn to the aileron (flap) using the screws and the control horn backplate. Be careful not to accidentally puncture the covering with the screwdriver.

Step 6. Thread a 2-56 clevis on the end of one of the threaded rods. Screw the clevis on 7-10 turns. Install the clevis with wire on the control horn into the third hole from the mounting base. Be sure to install the clevis keeper over the clevis.

Step 7. With the linkage attached to the control horn, center the control surface and hold the linkage wire directly over the electronically centered servo arm. Place a mark on the rod directly over the hole (second hole from the end of arm) in servo control arm that it will connect too.



Step 8. Make a 90-degree bend in the rod at the location you just marked and cut off the excess rod leaving 1/4" of rod past the 90-degree bend.

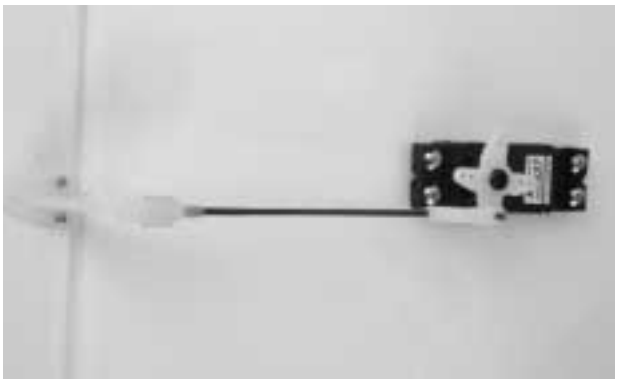
Section 14: Installing the Aileron and/or Quad Flap Linkages

CONTINUED

Step 9. Remove the clevis from the control horn. Attach a wire keeper to the end of the rod with the 90-degree bend.

Step 10. Insert the 90-degree bend through the second hole from the end of the servo arm and install the end of the wire keeper over the end of the wire. Install the clevis back onto the control horn. Be sure to slide on the silicon clevis keeper onto the end of the clevis.

Step 11. Repeat the process for the remainder of aileron/flaps linkages.



Section 15: Installing the Rudder, Elevator, and Throttle Pushrods

Parts Needed	Tools and Adhesives Needed
• Fuselage • 30" pushrod wire, 2-56 threaded on one end (2) • 16" pushrod wire, 1.5mm (throttle) • Control horn (2) • Wire keeper (2) • Clevis (2) • Easy connector • Clevis keeper (2)	• Felt-tipped pen/pencil • Hobby knife • Needle-nose pliers

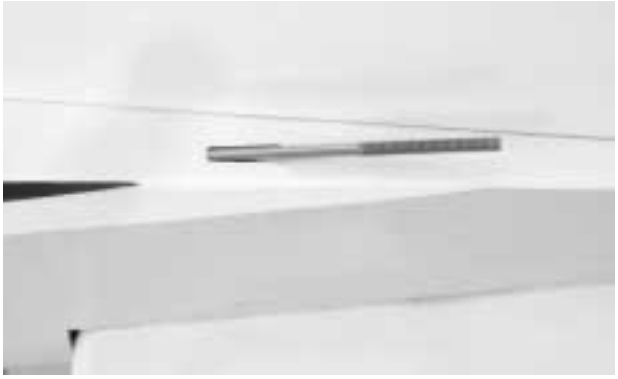
Step 1. Locate one of the long 30" pushrod wires threaded on one end, a 2-56 clevis, wire keeper, control horn, and mounting hardware and a clevis keeper.

The rudder and elevator push rods are made using these parts shown below. The throttle linkage will be made from the shorter 16" rod.

Step 2. Note that the pushrod wire guide tubes are preinstalled in the fuselage. On the aft end of the fuselage find the pushrod exits for the rudder and elevator pushrods.

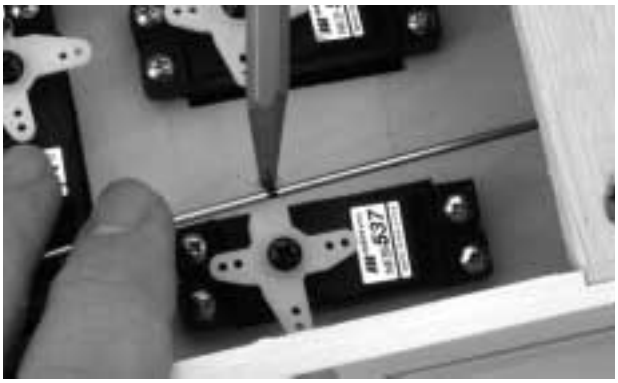
Hint: Slide one of the pushrod wires into to the preinstalled pushrod wire guide tubes and carefully push the end of the pushrod wire through the covering over the exit hole.

Using your hobby knife, carefully cut away the covering over the pushrod exit on the top left side of the fuselage next to the vertical stabilizer and the opening on the right side of the fuselage where the elevator pushrod will exit. Be careful not to cut the pushrod guide tube.



Step 3. To get the required length of the pushrod wire, it will be necessary to thread the clevis on/off the pushrod wire a few times. Insert one of the 30" pushrod wires through the guide tube with the threads exiting the tube at the aft end of the fuselage. Screw on a clevis 7-10 turns and snap it onto the control horn.

Step 4. With the clevis attached to the control horn, center the control surface and hold the pushrod wire directly over the electronically centered servo arm. Place a mark on the rod directly over the hole (second hole from the end of arm) in servo control arm that it will connect to.



Section 15: Installing the Rudder, Elevator, and Throttle Pushrods

CONTINUED

Step 5. Remove the clevis and slide the pushrod wire out of the guide tube. Make a 90-degree bend in the rod at the location you just marked and cut off the rod leaving 1/4" extend out from the 90-degree bend.

Step 6. Attach a wire keeper to the end of the rod with the 90-degree bend you just made.

Step 7. Insert the threaded end of the pushrod wire through the wire guide tube from the wing saddle opening of the fuselage. Install the 90-degree bend through the second hole from the end of the servo arm and install the end of the wire keeper over the end of the wire. Install the clevis back onto the pushrod wire and connect it to the control horn. Be sure to slide on the silicon clevis keeper onto the end of the clevis before attaching the clevis to the control horn. After the clevis is attached to the control horn, slide the clevis keeper of the ends of the clevis to insure it will not prematurely open.

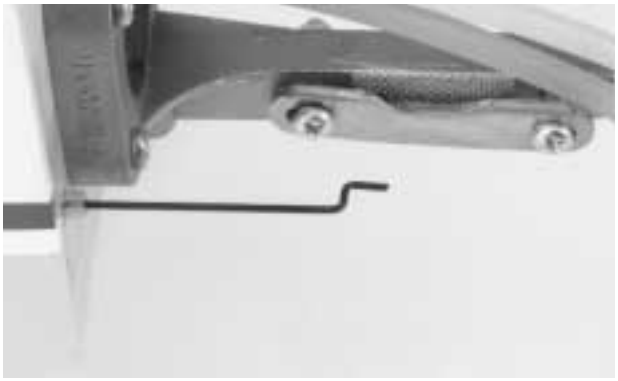
Step 8. Repeat the process for either the rudder or elevator, whichever one you have not done.

Installing the Throttle Pushrod

Sequence of installing the throttle pushrod in this manual is for most two and four-stroke engines. Installation may slightly vary, depending on the type/brand of engine you use to power your Ultra Stick™ 40.

Step 9. Locate the smaller 1.5 mm, 16" pushrod and make a "Z" bend in one end using needle nose pliers or "Z" bend pliers.

Step 10. From the firewall, insert the wire though the previously installed throttle pushrod wire guide tube.



Section 15: Installing the Rudder, Elevator, and Throttle Pushrods

CONTINUED

Step 11. Install the easy connector to the throttle servo arm by inserting the bottom post through the second hole from the end in the servo arm. Install the snap washer on the easy connector stem securing it to the servo arm.

Step 12. With the throttle pushrod wire installed into the fuselage slide the wire into the hole in the easy connector but do not tighten. Connect the "Z" bend of the pushrod to the throttle arm. It might be easier to remove the carburetor from the engine and install the throttle arm to the "Z" bend.

Step 13. Turn on your radio system and center your transmitter's throttle stick and trim and center your throttle servo arm. Put the throttle arm of your engine to be half open/closed.

Step 14. With your radio system on and throttle controls centered and throttle arm in the half open/closed, secure the throttle pushrod wire to the easy connector by tightening the screw in the top of the connector to the pushrod wire.

Section 16: Control Throw Recommendations

The following control throw recommendations offer positive response when using the aileron-only configuration and are a good place to begin setting up the aircraft. After you have become more familiar with the flight characteristics of the Ultra Stick 40, adjust the control throws to meet your flying style.

	Degree	Low Rate	Degree	High Rate
Aileron	17°	7/8" Up, 7/8" Down	32°	1 1/4" Up, 1 1/4" Down (both wing types)
Elevator	16°	7/8" Up, 7/8" Down	38°	1 7/16" Up, 1 7/16" Down
Rudder	24°	2" Right, 2" Left	35°	3" Right, 3" Left
Flaps	25%	1 1/4" Down	25%	

Section 17: Balancing the Ultra Stick™ 40

An extremely important step in preparing an aircraft for flight is ensuring it is properly balanced. Do not neglect this step. Each individual's Ultra Stick 40 will not be the same because of the various combinations of engines, servos, radio equipment, type of hardware used, and assembly methods used during building of the Ultra Stick 40. Always check the CG (center of gravity) with the fuel tank empty.

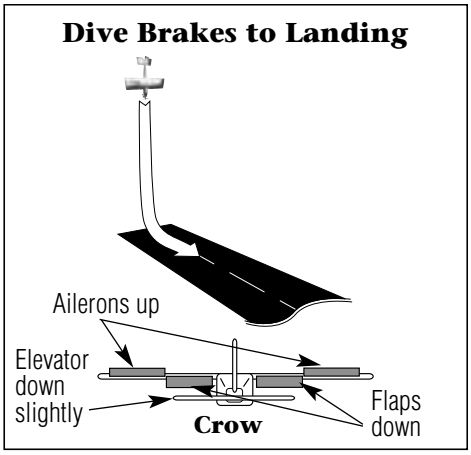
The recommended CG location for the Ultra Stick 40 is 3 1/2" to 4" behind the leading edge of the wing.

If necessary, add weight to either the nose or the tail until the correct balance is achieved. Stick-on weights are available at your local hobby shop and work well for this purpose.

Section 18: Quad Flaps

The quad flap option allows your Ultra Stick™ 40 to perform in ways that are just not possible with the conventional ailerons-only setup. With the quad flaps and a computer radio, different wing configurations can be programmed to extend the flight performance envelope. Plus, it's a great way to learn more about your computer radio. Some of these configurations include:

Crow



What is Crow?
Ailerons up, flaps down, elevator down.

What does Crow do?
Crow is a very high drag configuration that is commonly used as dive brakes to prevent the airplane from building up speed during steep descents/dives. Crow is great for bleeding off excess airspeed and/or altitude, making short landings from high altitudes possible. With a little practice, it's easy to shoot landings in front of yourself from 500 feet or more of altitude and just 100 feet downwind from where you're standing. Just deploy crow, push the nose straight down, and then pull elevator to level at about 10 feet and land right in front of yourself at a slow walking speed. The drag caused from Crow will prevent the Ultra Stick from gaining speed on the down line and, when the airplane is pulled to level, it will slow to a crawl within a short distance.

Another favorite maneuver that Crow allows is to fly nose high at very slow speeds with a high angle of attack (nearly 45°). Use full up elevator and jockey the throttle position to maintain level flight. This maneuver is sometimes called a Harrier. With crow activated, the Ultra Stick 40 has reduced tendency to tip stall. This is because the up ailerons at the tips of the wings (washout) help to keep the wing tips from stalling. Use the rudder only to steer the Ultra Stick during this maneuver and be careful if you turn off the Crow at these slow, high-angle-of-attack speeds, as there may not be enough airspeed to fly in the conventional mode.

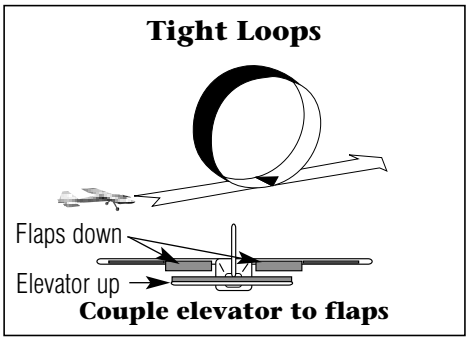
Anytime Crow is activated, the nose pitches up slightly, so it's recommended to mix some down elevator (about 5/8") whenever Crow is used.

First flight profile with Crow
On the first test flights, deploy the Crow at fairly high altitudes at various throttle settings to get a feel for what effects Crow has. You'll likely notice some reduction in roll control (ailerons) and the extra drag will drastically slow the airplane, no matter what throttle position or maneuver you're doing. Check to see if the nose pitches up or down and adjust the elevator mixing value after landing if necessary. Try some steep descents with Crow and notice that the Ultra Stick 40 builds up very little speed on the way down. Now go ahead and shoot some landings with Crow activated. You'll likely come up way short on your first few full Crow landings, so don't be surprised if you've got to add throttle. With a little practice, you'll confidently be able to do full-up elevator, tail-first landings.

On your first attempts to do the Harrier, start high. Deploy Crow and throttle back to idle; then, start adding up elevator smoothly. As full-up elevator is reached, increase the throttle just enough to maintain altitude. You can fly around in the nose high attitude using rudder only to steer and, with some practice, you'll be doing Harrier landings with ease.

What to watch out for
In Crow, the wing tips are effectively washed out due to the fact that the up ailerons reduce the tendency to tip stall, making for very stable slow flight when the airplane is upright. When in-verted or when doing outside maneuvers, this wash-out effectively becomes wash-in (ailerons are down) and, if you're not careful, a tip stall can occur. Be careful when flying inverted or doing outside maneuvers with Crow deployed as an unexpected tip stall could occur.

Also, when doing high angle-of-attack flight or the Harrier at very slow speeds, it's recommended that you keep the crow turned on. Crow allows the Ultra Stick 40 to actually fly slower and at higher angles of attack than in the conventional configuration.



Elevator-to-Flaps

What is elevator-to-flaps?
An up elevator command causes the flaps to go down, while a down elevator command causes the flaps to go up.

Section 18: Quad Flaps

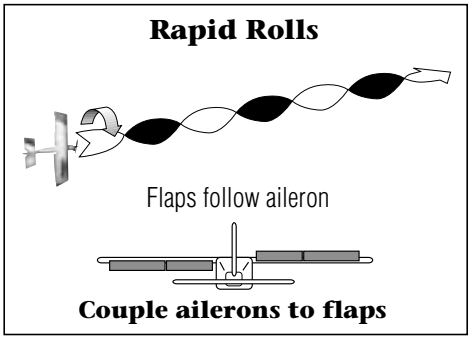
CONTINUED

What does elevator-to-flap do?
Elevator-to-flap mixing causes more aggressive pitching when elevator is applied, making for tighter inside and outside loops. Using the recommended throws, the Ultra Stick™ 40 is capable of very tight 15-foot diameter loops.

First flight profile
It's a good idea to start up high then turn on the elevator-to-flap mixing to get accustomed to the increased pitch (elevator) sensitivity. You may find it necessary to increase the elevator expo to tame the aggressiveness around center. Now try some full up loops first with the mixing on and then off to see just how effective elevator-to-flaps can be. With practice, you can bring these tight loops right down to the deck and even do tight head-high outside loops.

Things to watch out for
The only real place you may run into trouble here is getting used to the increased pitch sensitivity and thus over-control the airplane. Just take it easy, staying at least two mistakes high until you're comfortable with the way the Ultra Stick 40 responds. Later you may want to try differing amounts of flap travel with elevator to see the effects.

Aileron-to-Flaps



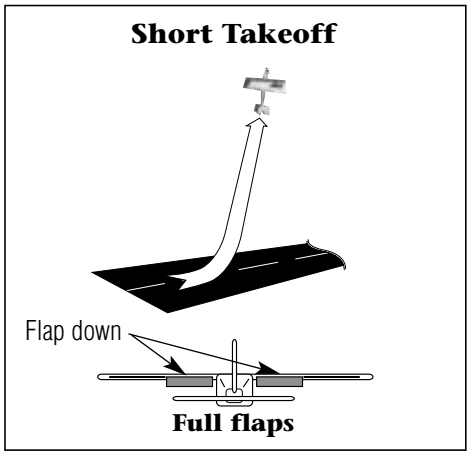
What is aileron-to-flap?
An aileron input causes the flaps to operate in the same direction as ailerons (i.e., a right aileron input causes the right aileron and right flap to go up and the left aileron and left flap to go down).

What does it do?
Aileron-to-flap mixing gives a more aggressive roll rate for doing rapid rolls. This mix also increases the rotation rate of snaps, spins, or any other maneuver that uses ailerons.

First flight profile
Start high and turn on the aileron-to-flap mix. Now do a couple of full-deflection, high-rate rolls and note the difference in roll rate. You should see about a 30% increase in roll speed. Now try a couple of snaps (full up, full right aileron, and full right rudder). You'll find snaps and spins tighter, faster, and more aggressive.

What to watch out for
Be careful not to over-control the ailerons on your first attempts.

Short Takeoff Flaps



What is short takeoff flaps?
The flaps are set to a down position.

What does it do?
Short takeoff flaps create a high-lift wing that allows the Ultra Stick to do very short takeoffs, in some instances (with a powerful engine and from asphalt) within the length of the fuselage.

First flight profile
After you have become comfortable with the flight characteristics of your Ultra Stick 40, it's time to give the short takeoff flaps a try. On the runway drop the flaps, then when you're ready, punch the throttle and hold some up elevator. Be ready for the Ultra Stick to break ground and head for the skies! It's important to release up elevator when the airplane breaks ground, then turn off the flaps to resume flights. On later flights try holding full up elevator to shorten the roll-out even more.

What to Watch Out For
On your first flap takeoffs, you may be surprised at just how quickly the Ultra Stick 40 pops off the ground, especially with a strong engine. Be ready to release any up elevator quickly. Also, you'll notice that the flap causes the nose to pitch up a bit. We normally don't recommend mixing in elevator compensation (a bit of down elevator), as the intention of short takeoff flaps is to get off the ground in as short a distance as possible. Just turn off the flap shortly after takeoff.

Section 19: Programming Guide

Following is a programming guide that provides step-by-step illustrations on how to program quad flap configurations for JR's XP652/642, XP783/347/388S, XP8103, and 10X/10SxII/10Sx radios, as well as for Futaba's 8-channel 8UA/S radio.

Once you understand your computer radio, you'll soon discover that there are many other possible programming configurations (e.g., right rudder causes the right aileron to go up and the right flap to go down, causing a severe right yaw). We challenge you to try as many possibilities as you can think of — just remember, start high!

If you come up with any interesting ideas, we'd like to hear from you.

Note: If you have a computer radio that's not listed, please consult the instructions included with that radio or contact the radio's manufacturer for programming information.

JR XP652 or XP642 ..... see pages 49–54
JR XP783 or XP347 or XP388S ..... see pages 55–62
JR XP8103 ..... see pages 63–70
JR 10X, 10SxII, 10Sx ..... see pages 71–74
Futaba 8UA/S ..... see pages 75–80

Section 19: Programming Guide — JR XP652/642

CONTINUED

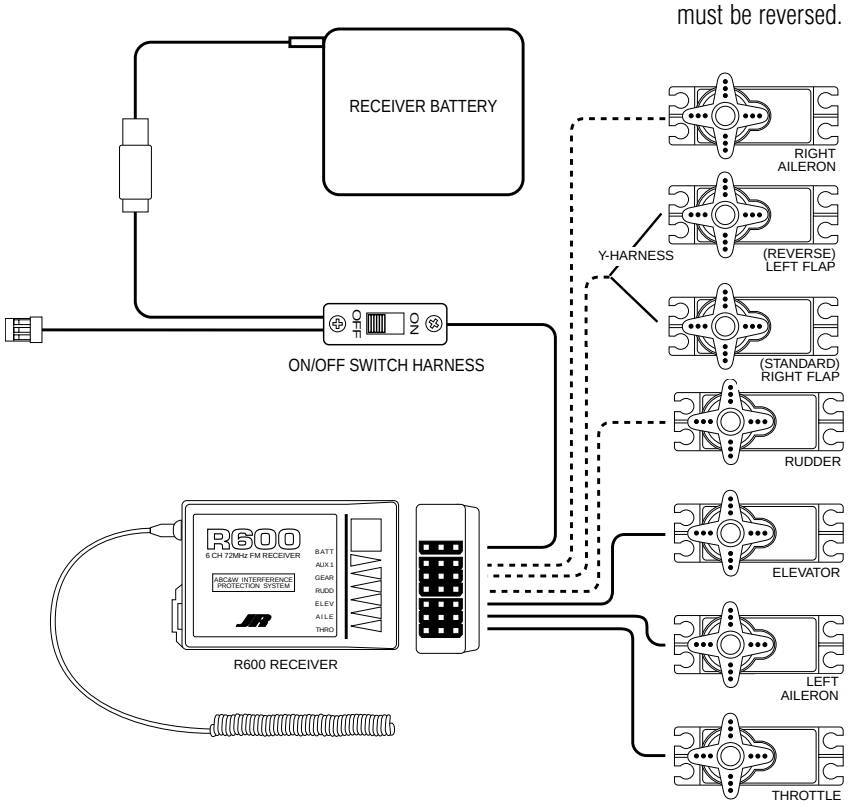
Programming Your JR XP652/642 in 10 Easy Steps

JR's XP652 and XP642 feature the same base level of programming, so the procedure for setting up quad flaps for each radio is identical.

Note: Because these are 6-channel radios, it's necessary to use one reversed servo and an Y-harness to connect the flap servos in the wing. This allows the Crow, takeoff flaps, and elevator-to-flap configurations to be used. However, the aileron-to-flap configuration is only available with 7-channel or more computer radios.

First, it's important to plug each servo into the correct port in the receiver.

Note: One flap servo must be reversed.



Note: When setting up a new aircraft, it's important to reset the programming to the factory defaults.

Section 19: Programming Guide — JR XP652/642

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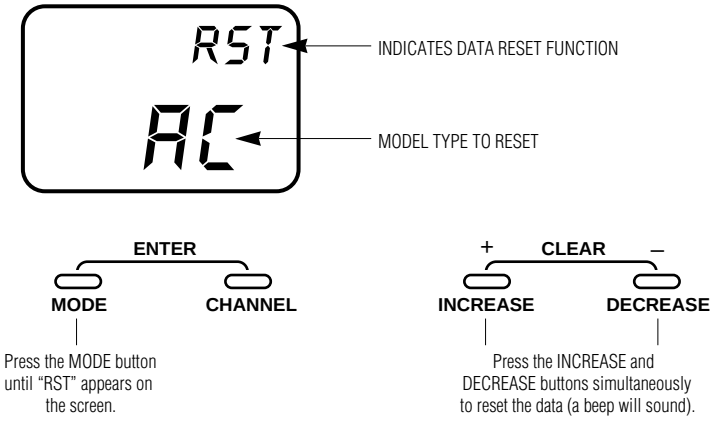
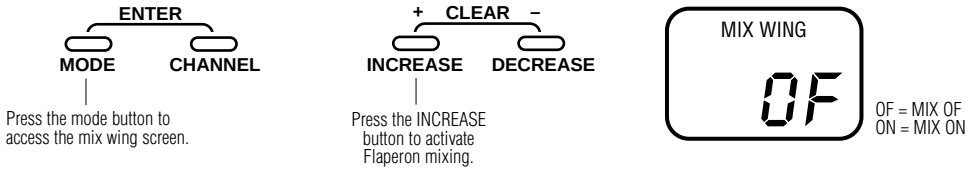
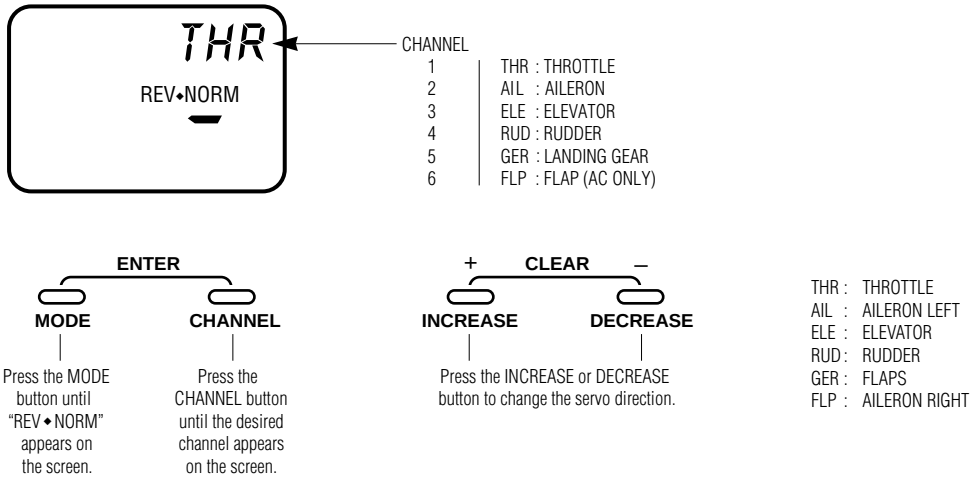


Step 1. Resetting the programming to factory defaults: Hold down both the *Mode* and *Channel* keys and turn on the radio to enter System Setup mode. Now press the *Mode* key until "RST" appears on your screen. Now press the *Increase* and *Decrease* keys simultaneously to reset the programming to factory defaults.



Step 2. Setting wing type to flaperons: In System Setup mode, press the *Mode* key until the "MIX WNG" screen appears. (See above) Now press the *Increase* key until "FPR ON" appears on the screen.



Step 3. Set reversing switches: Turn the transmitter off then back on again. Now press the *Mode* and *Channel* key simultaneously to access the Function mode. Now press the *Mode* key to access the "REV-Norm" screen. Press the *Channel* key to access each channel, then check that the selected channel is moving in the correct direction (e.g., a right aileron command cause the right aileron to go up and the left aileron to go down). To change the servo direction, press the *Increase* key. Check all channels and adjust as necessary.

Note: With the gear channel pulled toward you, the flaps should go down. With the flap switch pulled toward you, both ailerons should go up.

Section 19: Programming Guide — JR XP652/642

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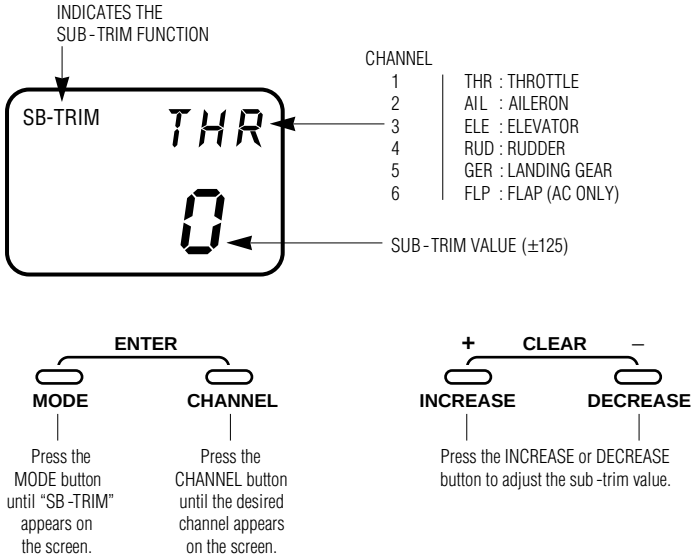
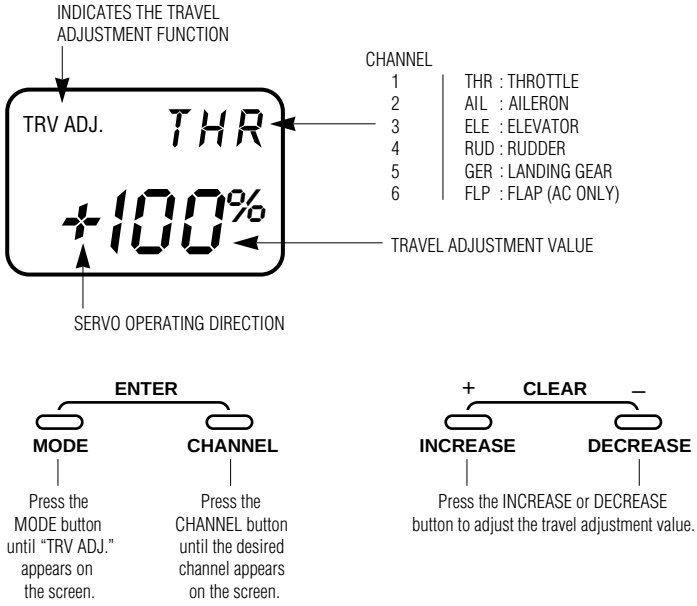


Step 4. Sub-trim: With the flap and gear switches in the rearward position and the mechanical trims centered, reposition any of the servo arms if necessary such that all control surfaces are at neutral or as close to neutral as possible. Now press the *Mode* key to access the SB-TRM function. The *Channel* key allows you to select the desired channel, while the *Increase* and *Decrease* keys change the center position. Adjust the sub-trim as necessary until all control surfaces are neutral.



Step 5. Set travel adjust: Press the *Mode* key until "TRV ADJ." appears on your screen. Pressing the *CH* key will allow access to each channel. Adjust the travel of each channel to the following using the *Increase* or *Decrease* keys.

Important: Move the flap switch to the rearward position. Adjust the FL. Travel adjust to 0%. Now reposition the servo arm so that the ailerons are neutral. If necessary, readjust the aileron sub trims slightly.

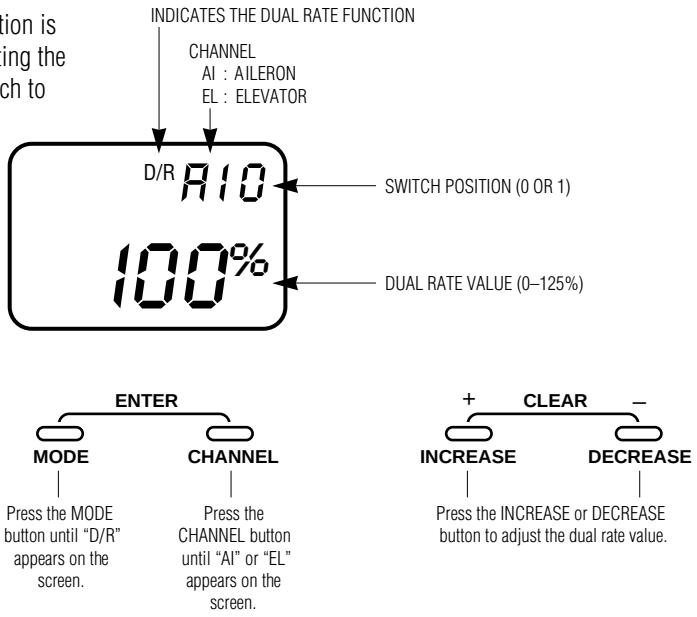
Note: To get the most performance out of your Ultra Stick™, long servo arms (1 inch) like JRPA215 are recommended. This provides for large control throws, allowing for more aggressive maneuvers. To achieve the control throws listed at right, long servo arms may be necessary.

Note: Use the Dual Rate function to achieve these throws, see page 52.

Throttle — Full throttle to full closed
Aileron — $1\frac{1}{4}$" up, $1\frac{1}{4}$" down
Elevator — $1\frac{7}{16}$" up, $1\frac{7}{16}$" down
Rudder — 3" right, 3" left (rudder throws measured at bottom)
Flaps — $1\frac{1}{4}$" down when the gear switch is pulled forward (adjust with GEAR channel travel adj.)

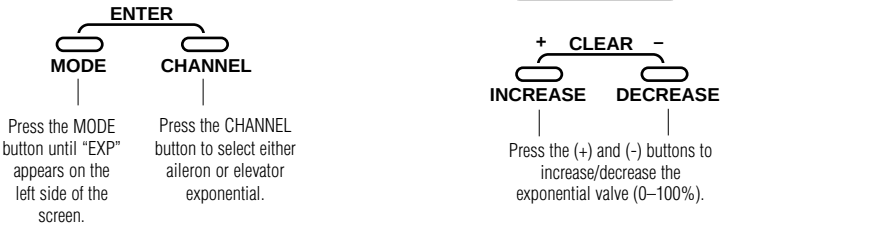
Section 19: Programming Guide — JR XP652/642

Note: The dual rate switch position is changed/accessed by setting the appropriate dual rate switch to the 0 or 1 positions.



Step 6. Adjusting the dual rates: Press the *Mode* key until the dual rate screen appears. The *Channel* key allows you to select the aileron or elevator channel while the respective dual rate switch allows you to select position 0 or 1. Adjust the high rate to 100% and the low rate to 50% using the *Increase* and *Decrease* keys. First flights should be attempted on low rates.

Note: The dual rate switch position is changed/accessed by setting the appropriate dual rate switch to the 0 or 1 positions.



Step 7. Using exponential: Exponential is used to reduce the sensitivity of control around center while still providing full control authority when the control stick is fully deflected. Because the Ultra Stick uses large control throws, it's a good idea to give Expo a try, even if you've never used it before, to help prevent over-controlling. Press the *Mode* key until "EXP" appears on your screen. Use the *Channel* key to select the aileron or elevator channel, then use the dual rate switch to access position 0 or 1. Separate expo values can be programmed for position 0 and 1. Press the *Increase* or *Decrease* keys to program the desired expo value for the selected channel and switch position. We recommend starting with an expo value of 25% on elevator and 30% on ailerons then, on subsequent flights, adjust the value until the desired control feel is achieved.

Section 19: Programming Guide — JR XP652/642

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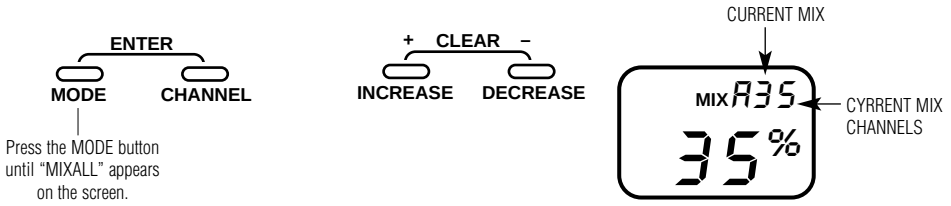
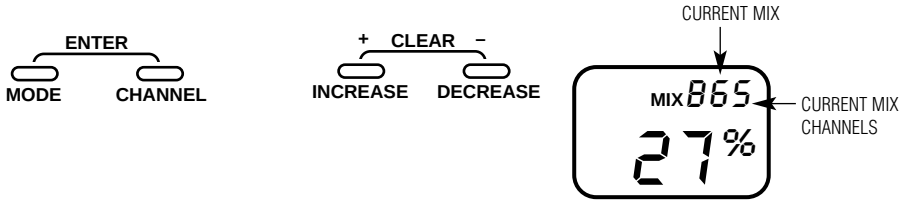
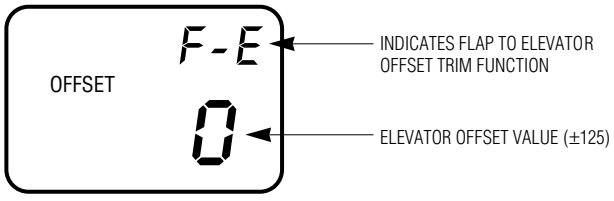


Step 8. Mixing elevator-to-flaps: Press the *Mode* key until the "MIX A11" screen appears. This is programmable MIX A and it allows you to mix any channel to any other channel or even to itself. Press the *Channel* key until the "MIX Ach" appears. This screen will allow you to select the master (elevator) and slave (in this case GEAR because GEAR is being used to deploy flaps). Elevator is channel 3, so press the *Increase* key until the screen reads "31." The first digit (3) is now the master channel (elevator). Now press the *Decrease* key until "35" appears in the screen. The second digit (5) is now the slave channel (gear, which we have Y-harnessed to flaps). This gives us an elevator-to-flap mix. Press the *Channel* key twice until "0%" appears on the screen. Now hold up elevator and press the *Increase* key until 35% is achieved. An up elevator command should result in the flap going down. If the flaps go up instead, this 35% value needs to be -35%. Press the *Decrease* key until -35% is achieved. Now holding down elevator, press the *Increase* or *Decrease* key so that the flap goes up 35%.

Note: It's possible to assign this mix to be turned off/on using a selected switch. Press the *Channel* key until "MIX-ASW" appears. Pressing the *Increase* key will allow you to assign this mix: F1 = flap switch, A = aileron dual rate switch, E = elevator dual rate switch, or ON = always on.



Step 9. Crow mixing: We've already done 1/3 of the work in crow mixing above when we activated the flaperons and adjusted the ailerons to go up when the flap switch is pulled in Steps 2 and 5. Now we need to add down flaps and some down elevator. To get down flap when the flap switch is pulled, we're going to mix flap as master to gear as slave. Press the *Mode* key until "MIXB11" appears on the screen. Now press the *Channel* key to access the "MIXBch" screen. Press the *Increase* key until "61" appears, then press the *Decrease* key until "65" appears in the screen. This programs channel 6 (flaps) as master and channel 5 (gear) as slave. Now press the *Channel* key until "MIX65 0%" appears on the screen. With the flap switch pulled forward, press the *Increase* key or *Decrease* key until the flaps go down 1 1/4."



Step 10. Elevator Offset: To set the necessary down elevator with crow, press the *Mode* key until "OFFSET F-E" appears on the screen. With the flap switch in the forward position, press the *Increase* or *Decrease* key until the elevator goes down 5/8."

Section 19: Programming Guide — JR XP652/642

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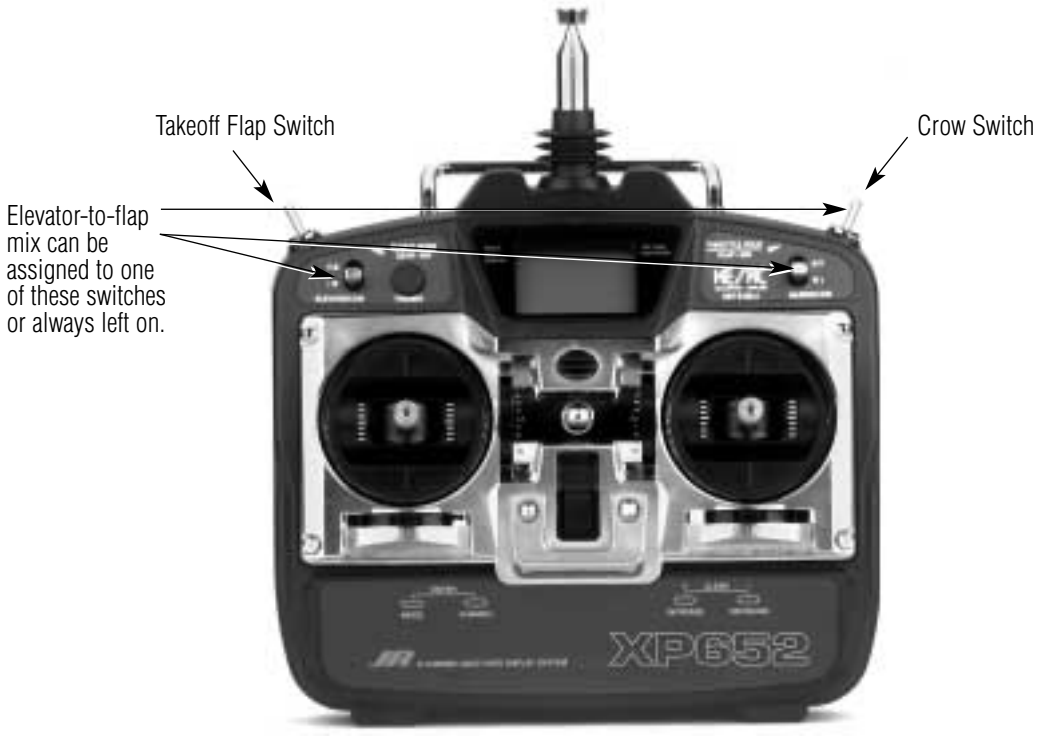


Note: The takeoff flaps should be retracted before using the Crow function to prevent any over-travel of the flap servos.

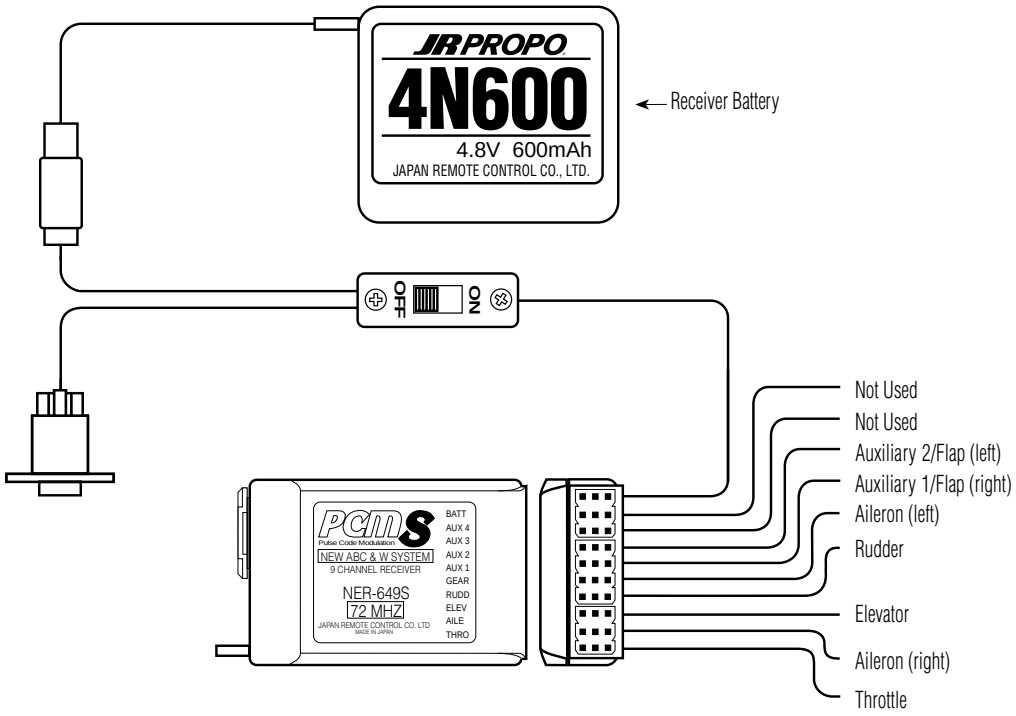
Section 19: Programming Guide — JR XP783/XP347/XP388S

Programming Your JR XP783, XP347 and XP388S in 14 Easy Steps

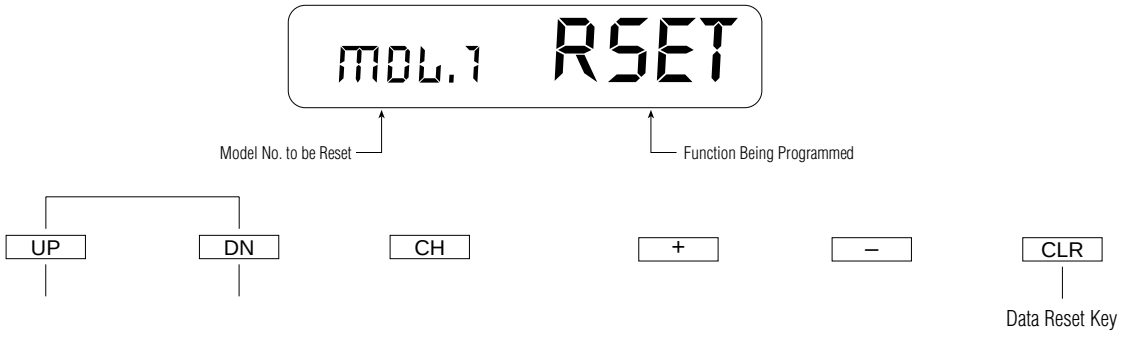
JR's XP783, XP347 and XP388S all feature the same base level programming, so the procedure for setting up quad flaps for each radio is identical.

Note: Most of the quad flap features needed for the Ultra Stick are already preprogrammed in the glider (referred to as GLID) software included in these three radios. While the Ultra Stick™ 40 is not a glider, there are several built-in features in the glider programming that make quad flap easier to program and use. We strongly suggest using the GLID model type programming that's included in these radios.

First, it's important to plug each servo into the correct port in the receiver.



When setting up a new aircraft, it's important to reset the programming to the factory defaults.



Step 1. Resetting the programming to factory defaults: Hold down both the *Up* and the *Down* keys simultaneously and turn on the radio to enter System Setup mode. Now press the *Up* key until "RSET" (reset) appears on the screen. Pressing the *CLR* key will reset the programming to the factory defaults.

Section 19: Programming Guide — JR XP783/XP347/XP388S

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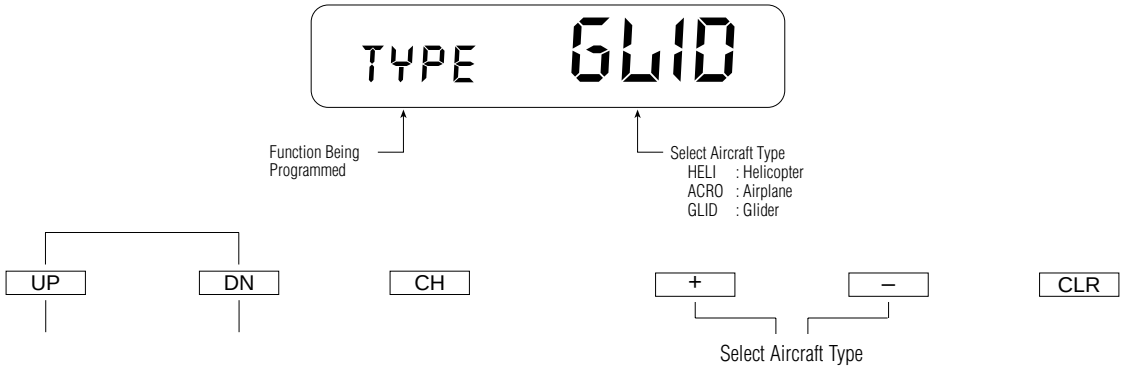
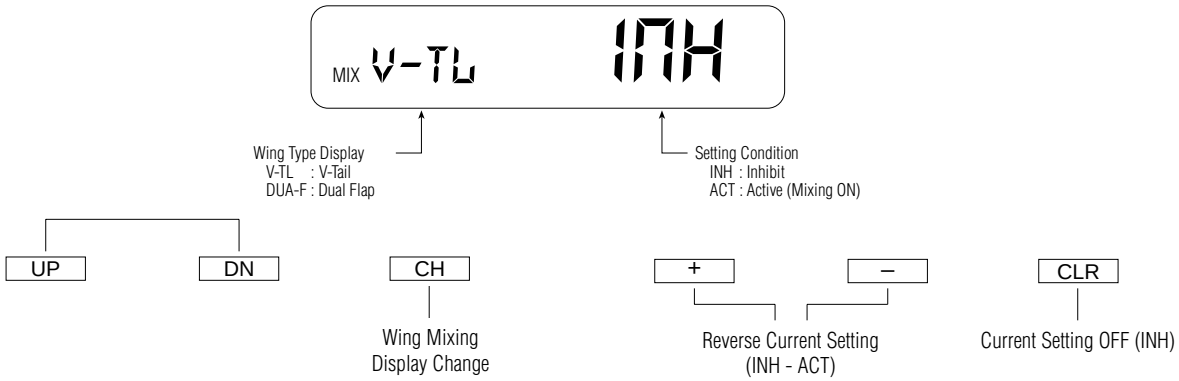
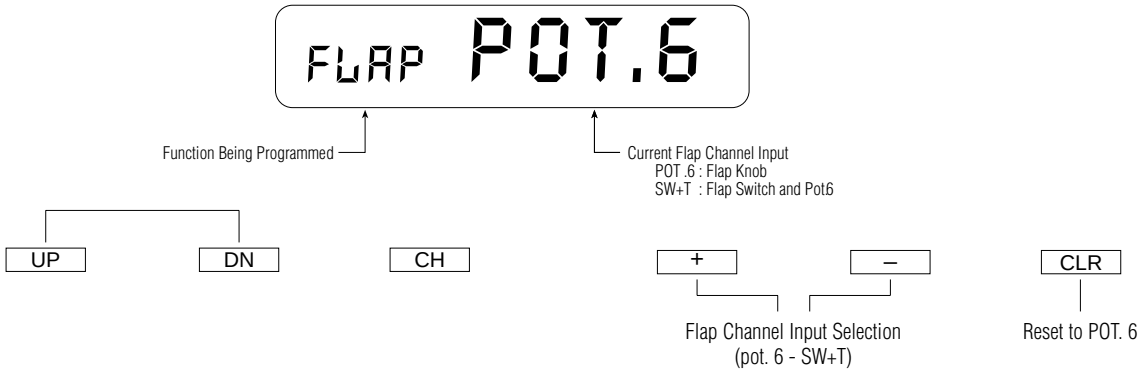


Step 2. Selecting model type (GLID): In System Setup mode, press the *Up* key until the "TYPE" screen appears. Now press the (+) key until "GLID" appears on the screen.



Step 3. Activating dual flap: In System Setup mode, press the *Up* key until the "V-TL INH" screen is displayed. Press the *CH* key to access the mix "DUA.F" screen. Press the (+) key to activate (ACT) the dual flap function.



Step 4. Assigning the flaps to the flap switch: In System Setup mode, press the *Up* key until "FLAP POT.6" appears on the screen. Press the (+) key so that "SW+T" appears.

Note: With the JR X347 the flaps are automatically assigned to the switch, this step should be ignored.

Section 19: Programming Guide — JR XP783/XP347/XP388S

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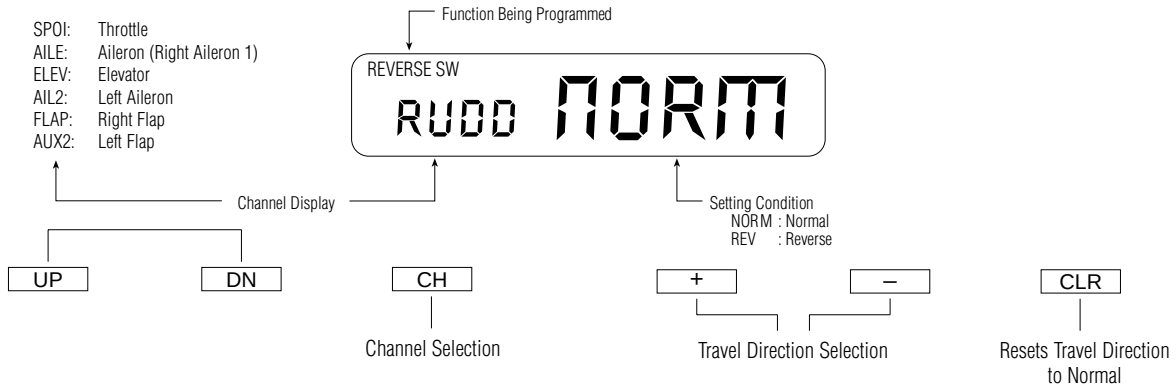
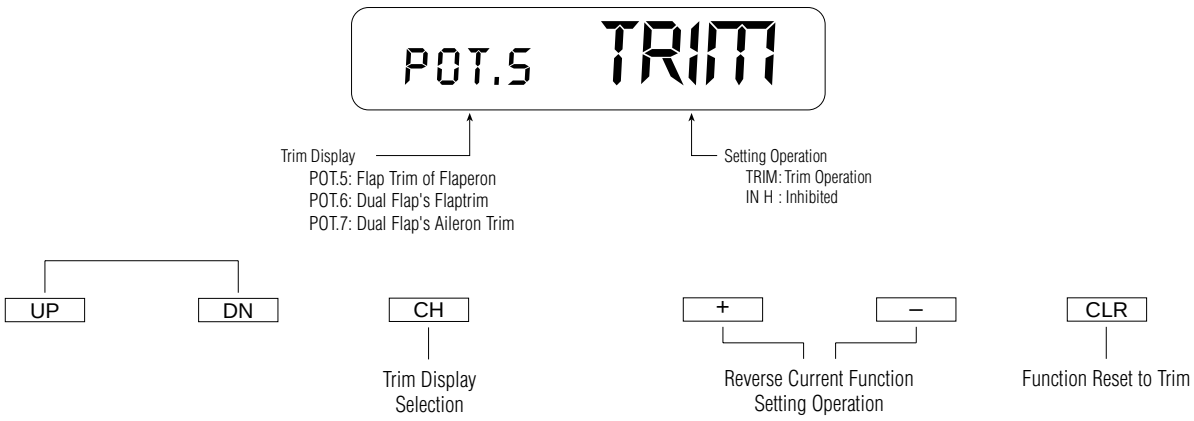


Step 5. Setting servo reversing: Turn the transmitter off, then back on again. Press the *Up* and *Down* keys simultaneously to access the Function mode. Press the *Up* key until the "REV" function appears on the screen. Press the *Channel* key to select each channel and check that the servo direction is operating correctly for each channel. To change the direction of the selected channel, press the (+) or (-) key. Check and adjust all channels as necessary.

Note: When the three-position flap switch is pulled down, the flap should come down. If they go up, reverse the direction of channel 6 (AUX 1) and/or 7 (AUX 2)

Note: Because the GLID model programming is being used, the transmitter refers to the throttle function as SPOI or spoilers. Any time "SPOI" is displayed, it functions as throttle.



Step 6. Turning off the trim knobs: In Function mode, press the *Up* key until the "POT.5 TRIM" screen appears. Pressing the *CH* key will advance through the three available trim pots: 5, 6, and 7. Inhibit all three by pressing the (+) key when each one is selected. This will prevent any unwanted control movement should the knobs be moved.

Note: With the 347, POT.6 is not available.

Section 19: Programming Guide — JR XP783/XP347/XP388S

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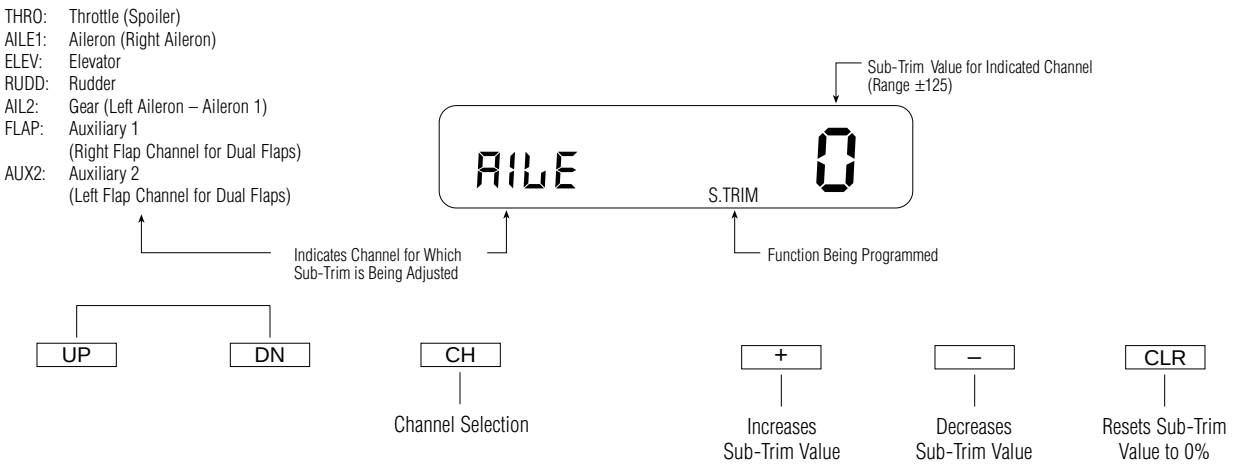
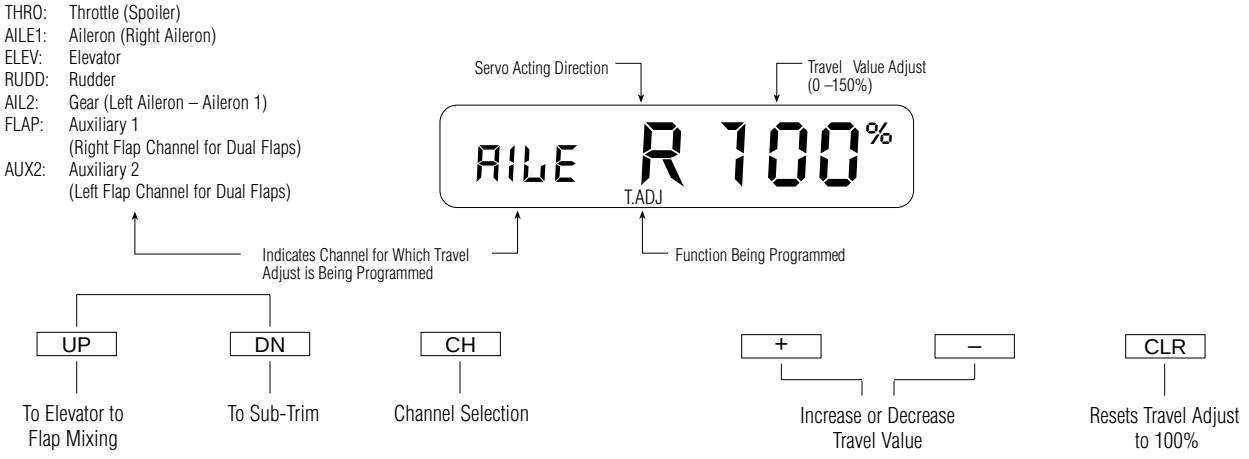


Step 7. Adjusting the sub trims: Turn on the transmitter and receiver and center the trims. Move the flap switch in the upper position. Now reposition all the servo arms so that all the control surfaces are as close as possible to their neutral positions. In System Setup mode, press the *Up* key until the "S.TRIM" screen appears. Now press the *Channel* key to access the desired channel and press the (+) or (-) key to perfectly center each control surface.



Note: The throttle is referred to as "SPOI" in the glider mode.

Step 8. Setting Travel Adjust: Press the *Up* key until the "T.ADJ" screen appears. Pressing the *CH* key will allow access to each channel. Adjust the travel of each channel to the throws shown below using the (+) or (-) key. Move the corresponding control stick in the desired direction to adjust the travel amount in that direction.

Note: To get the most performance out of your Ultra Stick™, long servo arms (1") are recommended. This provides for large control throws for more aggressive maneuvers. To achieve the control throws listed below, long servo arms may be necessary.

Note: Adjust the right flap travel first, then the left flap.

Throttle — Full open to full closed with trim
(Referred to as "SPOI" in GLID mode)
Aileron — $1\frac{1}{4}$" up, $1\frac{1}{4}$" down
Elevator — $1\frac{7}{16}$" up, $1\frac{7}{16}$" down
Rudder — 3" right, 3" left
Full Flaps — $1\frac{5}{8}$" down

Section 19: Programming Guide — JR XP783/XP347/XP388S

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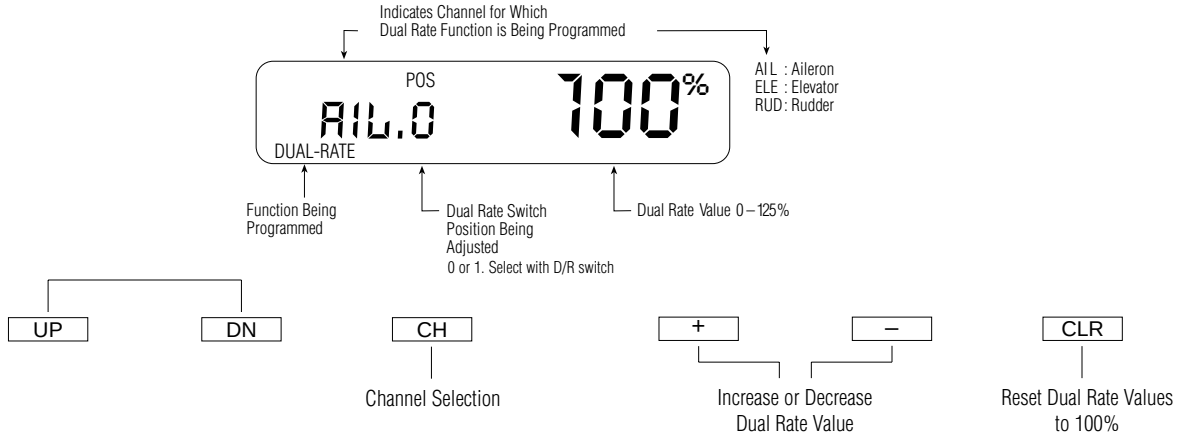
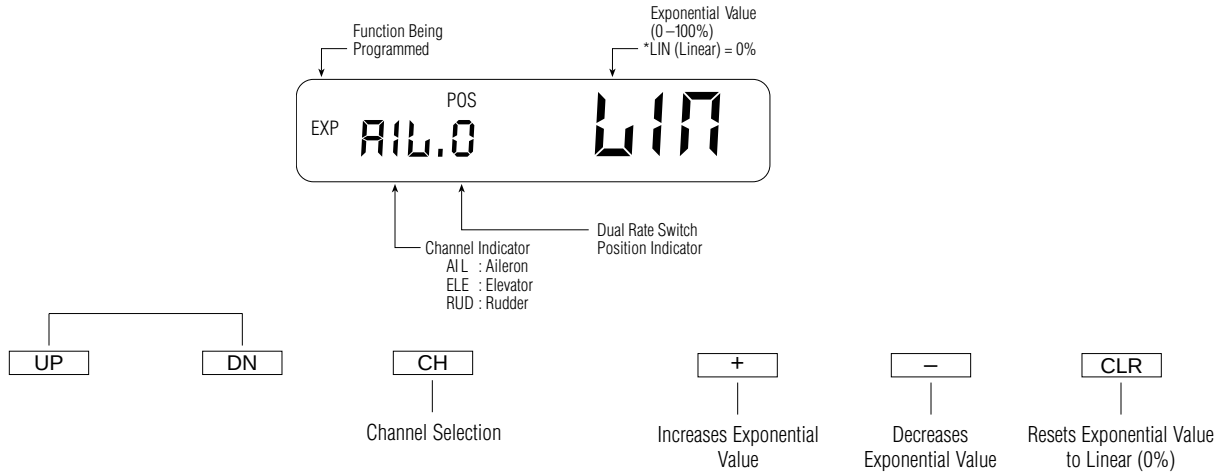


Step 9. Adjusting the dual rates: Press the *Up* key until the "DUAL-RATE" screen appears. The *CH* key allows the selection of the aileron, elevator or rudder channels, while the respective dual rate switch allows you to select position 0 or 1. Adjust the high rate for each channel to 100% and the low rate to 50% using the (+) or (-) keys. First flights should be attempted using low



Step 10. Using exponential: Exponential is used to reduce the sensitivity of control around center while still providing full control authority when the control stick is fully deflected. Because the Ultra Stick™ 40 uses large control throws, it's a good idea to give expo a try, even if you've never used it before, to help prevent over-controlling. Press the *Up* key until the "EXP" screen appears. Use the *Channel* key to select the aileron, elevator, or rudder channel, then use the corresponding dual rate switch to select position 0 or 1. Separate expo values can be programmed for position 0 and 1. We recommend an expo value of 30% on aileron and 25% on elevator and rudder for the first flights, then on subsequent flights, adjust the value until the desired control feel is achieved.

Section 19: Programming Guide — JR XP783/XP347/XP388S

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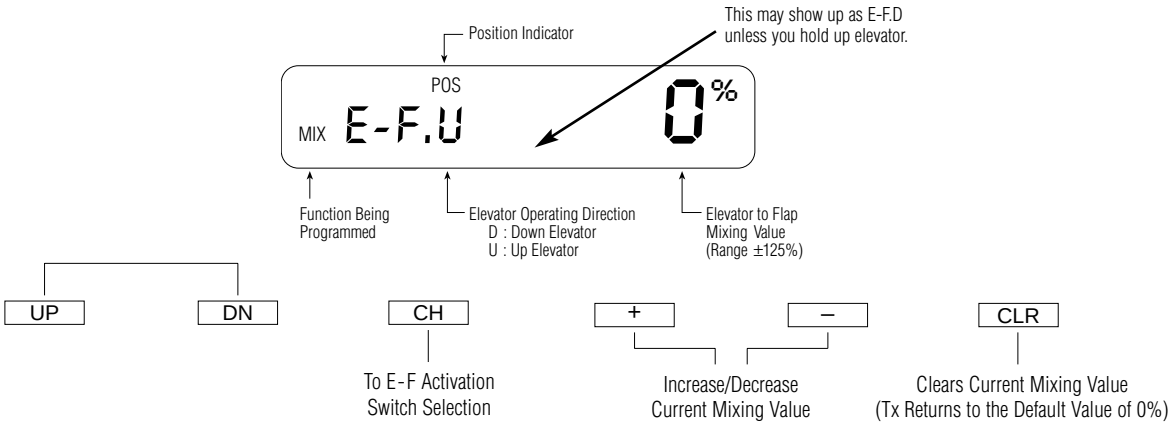
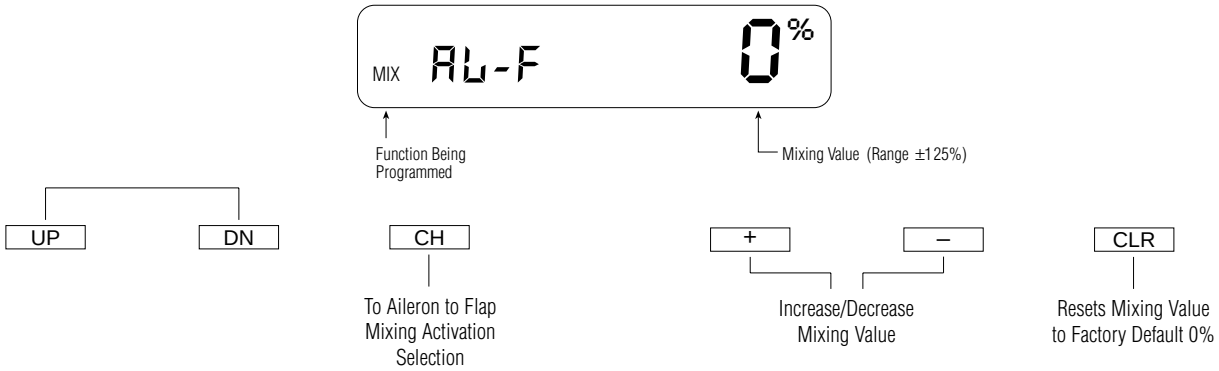


Step 11. Mixing elevator to flap: With the flap switch in the upper position, press the *Up* key until "MIX E-F.U" appears on your screen. This is the elevator-to-flap mix. Press the *CH* key to access the "EF: SW"screen. This screen allows you to select which switch will be used to turn on/off the elevator to flap mixing. Pressing the (+) key will select one of the following switches: MX SW = mix switch (located on the back right of the transmitter), F-DN = flap switch down, F-UP = flap switch up, or ON = always on. We suggest selecting the mix switch MXSW so the elevator-to-flap mix can be turned on and off independently of the flaps. After selecting MXSW, press the *CH* key to access the "MIX E-F.U" screen. With the Mix switch in the forward position, hold up elevator and press the (+) key until a 35% value is achieved. Up should result in down flaps. If the flap goes up, then reverse the 35% value from a +35 to a -35 using the (-) key. Now hold down elevator and press the (+) key until 35% is achieved. The flaps should go up. Reverse the value if necessary until up elevator gives down flaps and down elevator give up flaps. Later you can experiment with more or less flap throw by changing this value. 35% is a good, safe place to start.

Note: The XP347 doesn't allow the elevator-to-flap mixing to be assigned to another switch and it remains on the flap up position.



Step 12. Aileron to flap mixing: Press the *Up* key until the mix "AL-F" (aileron- to-flap mix) screen appears. Press the *CH* key to access the "MIX AF: SW" screen. This screen allows you to select which switch is used to turn on/off the aileron-to-flap mix. Pressing the (+) key will select one of the following switches: MXSW = mix switch located on the back right of the transmitter, F-DN = flap switch down, FU+D = flap switch up and down, and ON = always on. We recommended putting the aileron-to-flap mix on the mix switch so the mix can be turned off independently from the flaps. After selecting MXSW, press the *CH* key to return to the "MIX AL-F" screen. Now press the (+) key until +100% value is reached. Now the flaps should move in unison in the same direction with the ailerons. If they move in opposite directions, press the (-) key until a -100% value is reached.

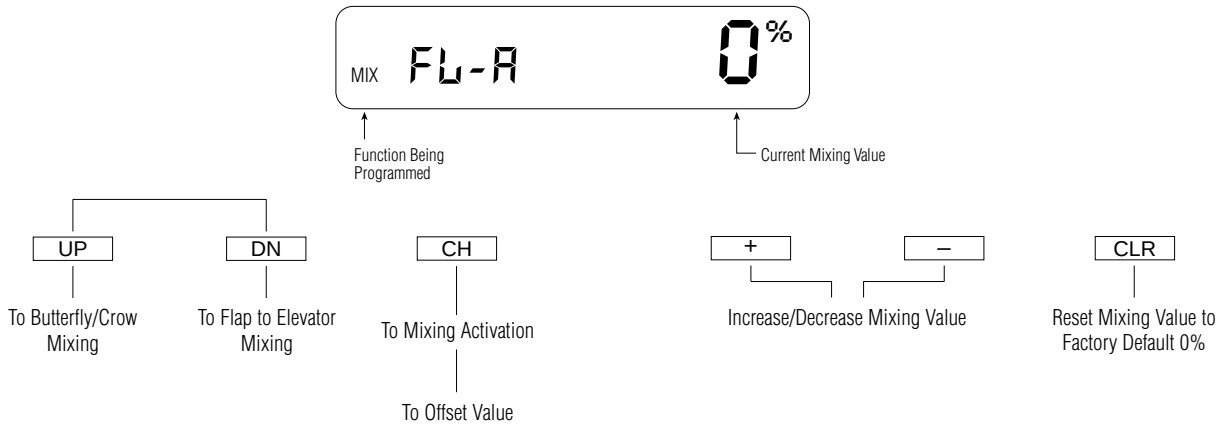
Note: When programmed, the aileron-to-flap mixing is always on when using an XP347.

Note: If "OFF" appears (where the mixing value is located in our example) move the flap switch to the opposite position. If "OFF" is still on the LCD, move the mixing switch to the opposite position.

Section 19: Programming Guide — JR XP783/XP347/XP388S

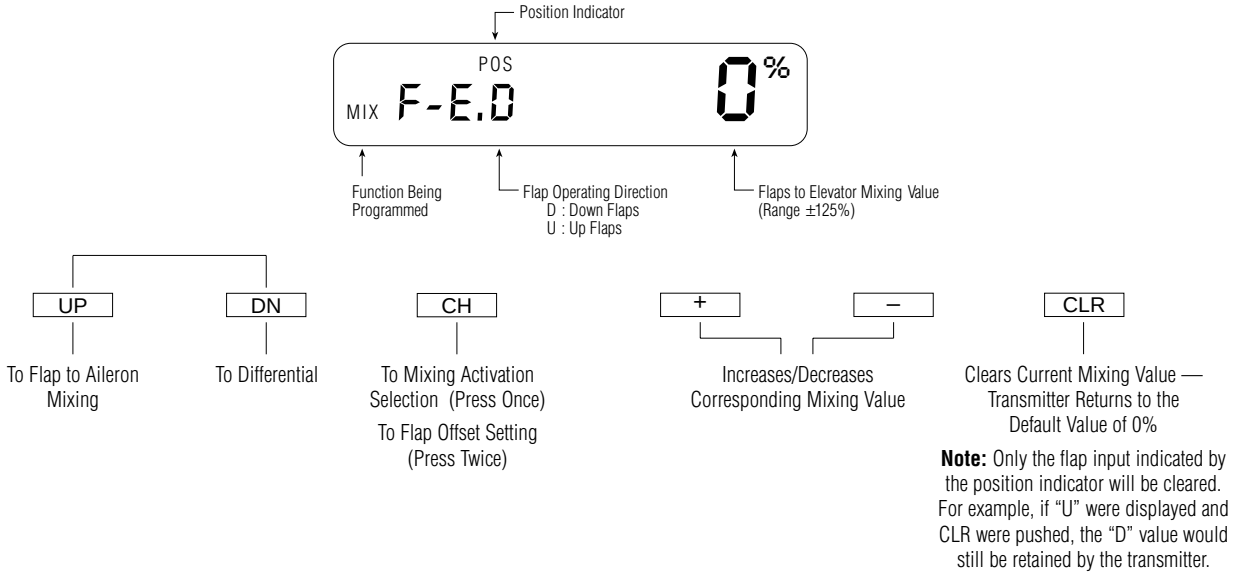
CONTINUED

Step 13: Setting up Crow: Crow will be assigned to the flap switch and will be activated when the switch is in the down position. We've already set the flaps to the proper down position in Step 7 travel adjust. Now we need to add the ailerons up 3/4" and the elevator down 5/8".



Step 14. Flap to ailerons mixing: Press the *Up* key until the "MIX FL-A" screen appears. Now press the *CH* key to access the "MIX FA: SW" screen (flap-to-aileron switch selection). Press the (+) key until "F-DN" (flap-down) appears on the screen. Now press the *CH* key twice to return to the "FL-A" screen. Move the flap switch to the down position. Next press the (+) key until both the ailerons go up 3/4 ". If the ailerons go down, press the (-) key.

Note: With the XP347, the flap-to-aileron mix is always on when programmed.



Step 15. Flap-to-elevator mixing: In Function mode, press the *Up* key until "MIX F-E" appears on the screen. Next press the *CH* key to access the "FE: SW" (flap-to-elevator switch selection) screen. Press the (+) key until "F-DN" (flap down) appears on the screen. Now press the *CH* key twice to return to the "MIX F-E" screen. With the flap switch in the down position, press the (+) key until the elevator comes down 1/4". If the elevator goes up, use the (-) key to reverse this.

Section 19: Programming Guide — JR XP783/XP347/XP388S

CONTINUED

Flap Switch
UP = Normal
MID = Takeoff flaps
DOWN = Crow

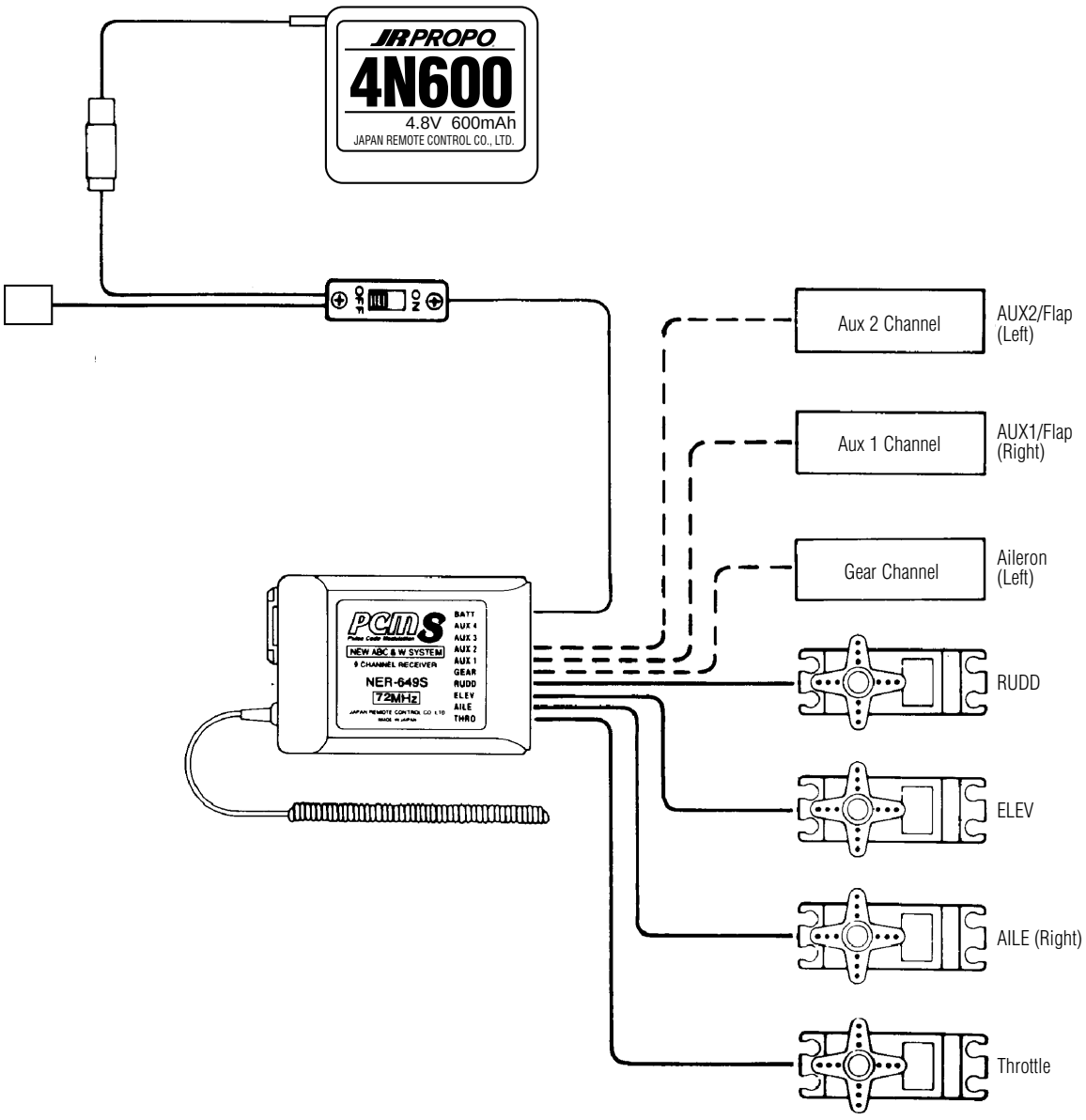
Mix Switch = Turns on/off aileron-to-flaps and elevator-to-flaps mixes

Section 19: Programming Guide — JJR XP8103

Programming JR's XP8103 in 14 Easy Steps

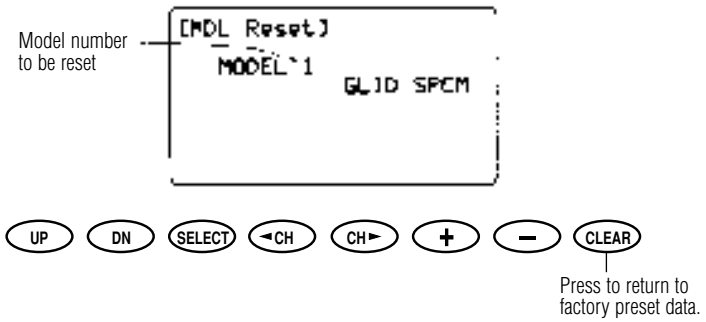
Note: Most of the quad flap features needed for the Ultra Stick are already preprogrammed in the glider (referred to as GLID) software included in the XP8103. While the Ultra Stick™ 40 is not a glider, there are several built-in features in the glider programming that make quad flap easier to program and use. We strongly suggest using the GLID model type programming that's included in these radios.

First, it's important to plug each servo into the correct port in the receiver.

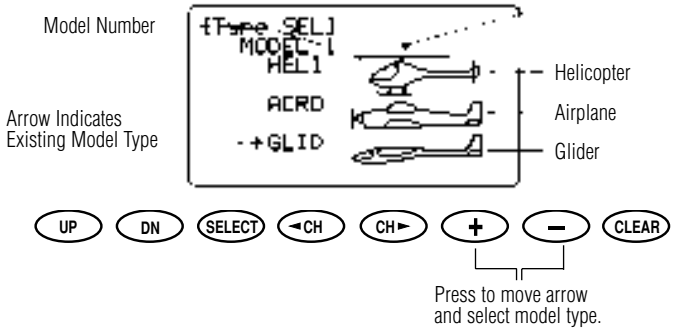


Section 19: Programming Guide — JJR XP8103

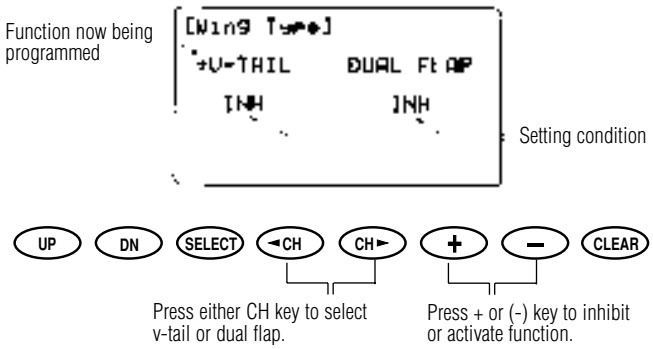
Note: When setting up a new aircraft, it's important to reset the programming to the factory defaults.



Step 1. Resetting the programming to factory defaults: Hold down both the *Up* and the *Down* keys and turn on the radio to enter System Setup mode. Now press the *Up* key three times to move the cursor to the "MDL Reset" menu (Model Reset). Press the *Up* and *Down* keys simultaneously to enter the "MDL Reset" screen. Now press the *CLR* key to reset the programming to the factory defaults.



Step 2. Selecting model type (GLID): In System Setup mode, press the *Up* key until the "Type SEL" screen appears. Now press the (+) key until the cursor points to "GLID" on the screen.



Step 3. Activating dual flap: In System Setup mode, press the *Up* key until the "Wing Type" screen is displayed. Press the *CH* key to move the cursor to "DUAL FLAPS." Next press the (+) key to activate (ACT) the dual flap function.

Section 19: Programming Guide — JJR XP8103

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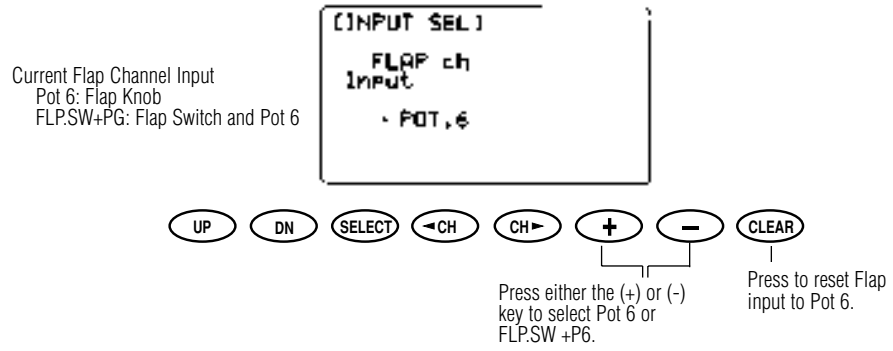
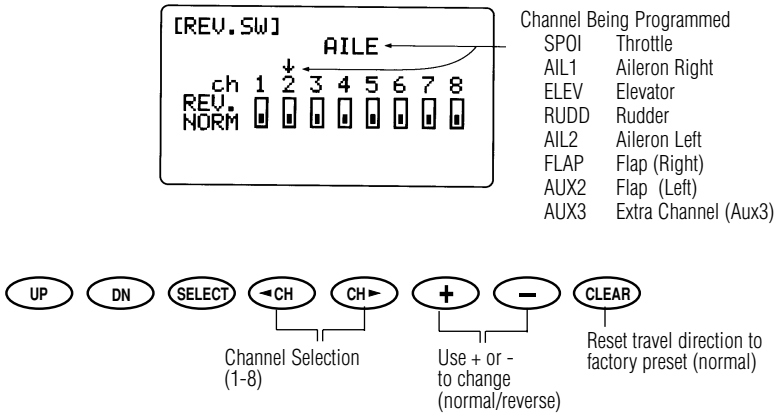


Step 4. Assigning the flaps to the flap switch: In System Setup *Mode* press the *Up* key until "Input Sel." (Flap Input) appears on the screen. Press the (+) key so that "FLP.SW+P6" appears in the lower screen.



Step 5. Setting servo reversing: Turn the transmitter off and then back on again. Press the *Up* and *Down* keys simultaneously to access the Function mode. Press the *Up* key until the "REV.SW" function appears on the screen. Press the *Channel* key to select each channel and check that the servo direction is operating correctly for each channel. To change the direction of the selected channel, press the (+) or (-) key. Check and adjust all channels as necessary.

Note: When the three-position flap switch is pulled down, the flap should come down. If they go up, reverse the direction of channel 6 (FLAP) and or 7 (AUX 2).

Note: Because the GLID model programming is being used, the transmitter refers to the throttle function as SPOI or spoilers. Any time "SPO"I is displayed, it functions as throttle.

Section 19: Programming Guide — JJR XP8103

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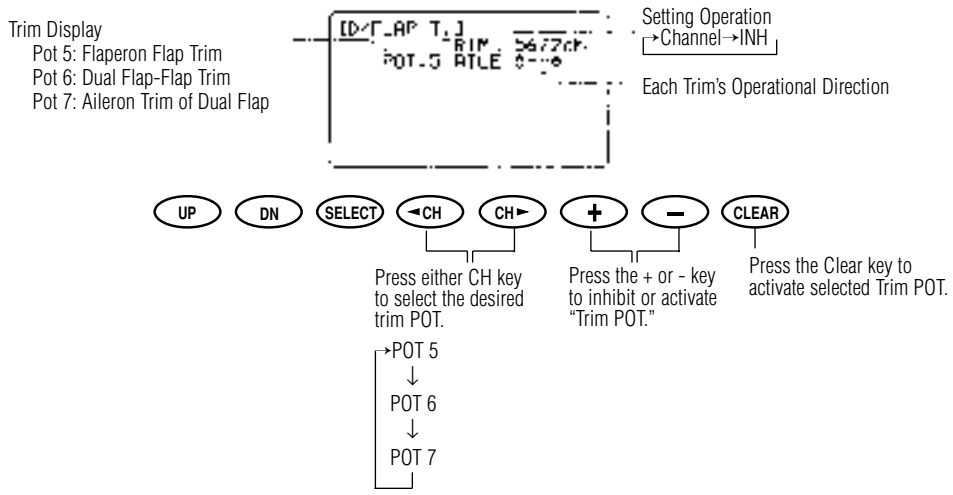
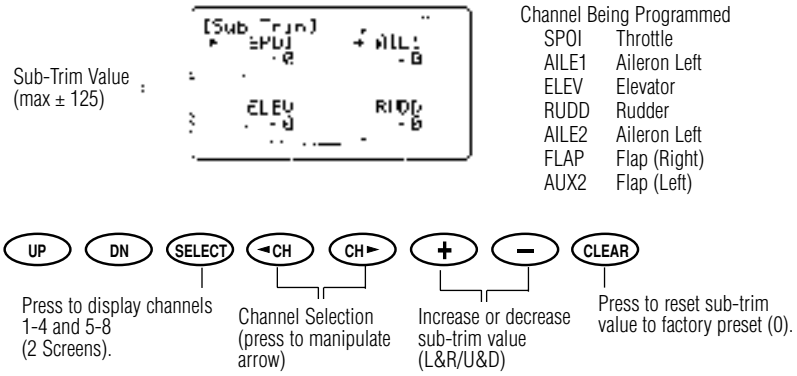


Step 6. Turning off the trim knobs: In Function mode, press the *Up* key until the "D/FLAP T". (dual flap trim) screen appears. Pressing the *CH* key will advance through the three available trim pots: 5, 6 and 7. Inhibit all three by pressing the (+) key when each one is selected. This will prevent any unwanted control movement should the knobs be moved.



Step 7. Adjusting the sub-trims: Turn on the transmitter and receiver and center the trims. Move the flap switch in the upper position. Now reposition all the servo arms so that all the control surfaces are as close as possible to their neutral positions. In System Setup mode, press the *Up* key until the "Sub-Trim" screen appears. Now press the *Channel* key to access the desired channel and press the (+) or (-) key to perfectly center each control surface. Press the *Select* key to access the other four channels.

Note: The throttle is refereed to as "SPOI" in the glider model.

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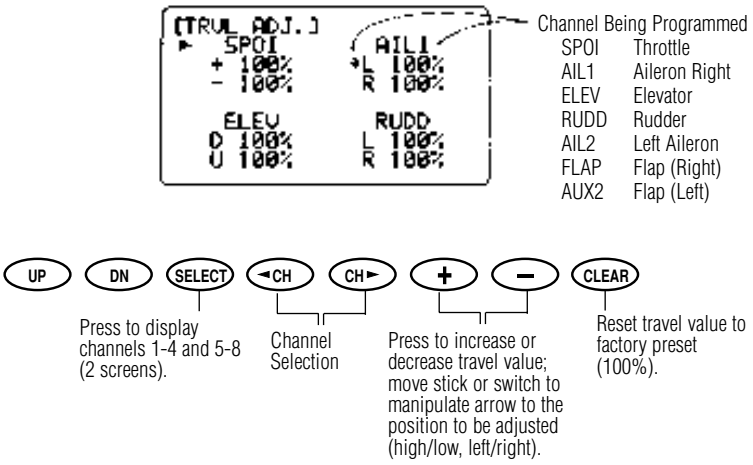
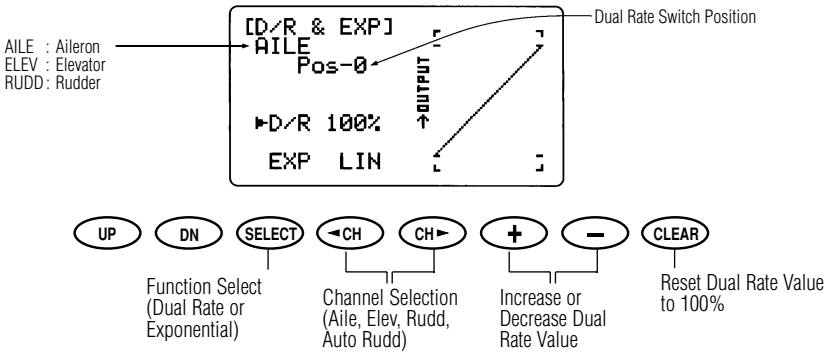


Step 8. Setting travel adjust: Press the *Up* key until the "TRVL ADJ." screen appears. Pressing the *CH* key will allow access to each channel. Adjust the travel of each channel to the following throws using the (+) or (-) key. Move the corresponding control stick in the desired direction to adjust the travel amount in that direction. Press the *Select* key to access the other four channels.

Note: To get the most performance out of your Ultra Stick™, long servo arms (1") are recommended. This provides for large control throws for more aggressive maneuvers. To achieve the control throws listed below, long servo arms may be necessary.

Throttle — Full open to full closed with trim (referred to as SPOI in GLID mode)
Aileron — 1 1/4" up, 1 1/4" down
Elevator — 1 7/16" up, 1 7/16" down
Rudder — 3" right, 3" left
Full Flaps — 1 1/4" down



Step 9. Using exponential: Exponential is used to reduce the sensitivity of control around center while still providing full control authority when the control stick is fully deflected. Because the Ultra Stick™ 40 uses large control throws, it's a good idea to give expo a try, even if you've never used it before, to help prevent over-controlling. The exponential rate is adjusted in the same screen as the dual rate from above. In the "D/R & EXP" screen, press the *Select* key to move the cursor to the EXP at the bottom of the screen. Pressing the (+) key will adjust the expo value. Use the *Channel* key to select the aileron, elevator or rudder channel, then use the corresponding dual rate switch to select position 0 or 1. Separate expo values can be programmed for position 0 and 1. We recommend an expo value of 30% on aileron and 25% on elevator and rudder for the first flights then, on subsequent flights, adjust the value until the desired control feel is achieved.

Always use A+ Expo Value! Using the A- expo value will actually make control response more sensitive around center and could cause a crash.

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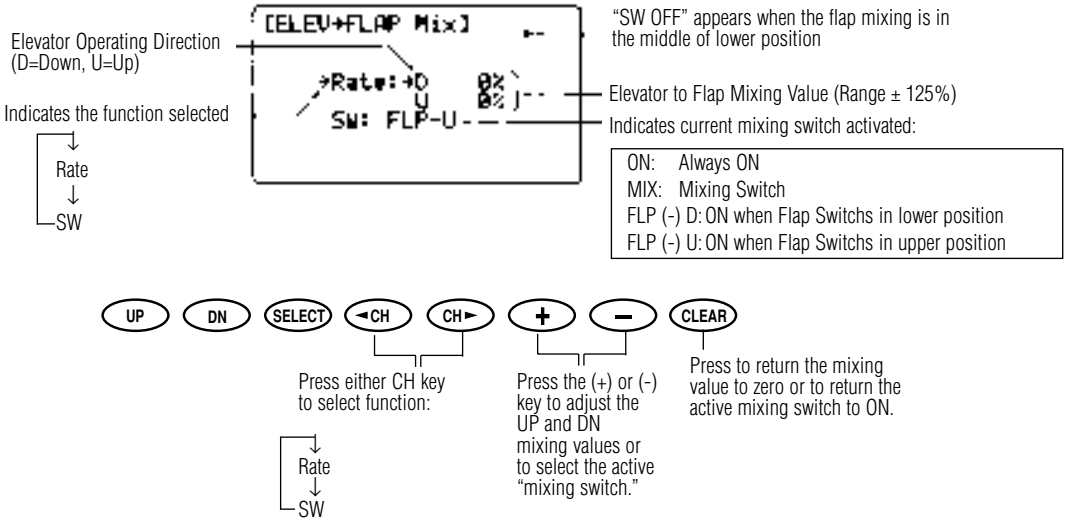
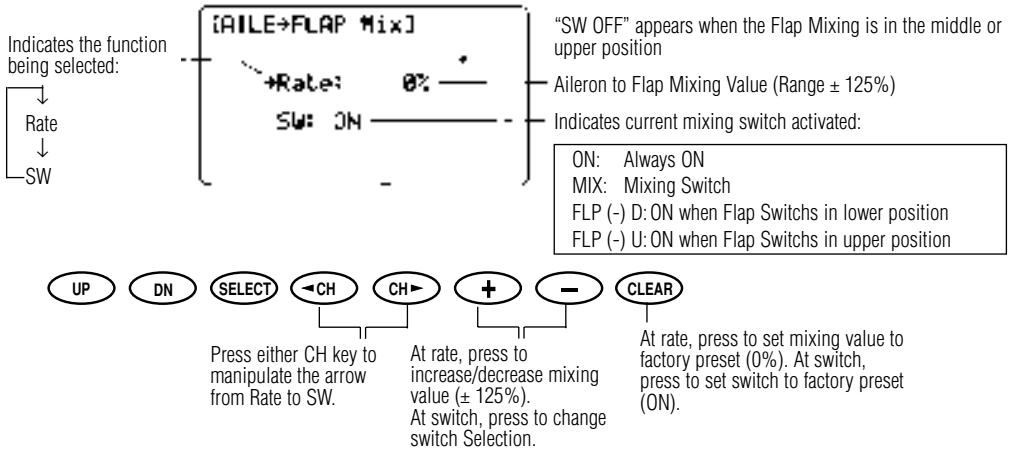


Step 10. Mixing elevator to flap: In Function mode, press the *Up* key until "ELEV-FLAP Mix" appears on your screen. This is the elevator-to-flap mix. Press the *CH* key move the cursor to SW:. This allows you to select which switch will be used to turn on/off the elevator-to-flap mixing. Pressing the (+) key will select one of the following switches: MIX = mix switch (located on the back right of the transmitter), FLP-D = flap switch down, FLPU flap switch up, or ON = always on. We suggest selecting the mix switch mix so the elevator-to-flap mix can be turned on and off independently of the flaps. After selecting MIX, press the *CH* key to return the cursor to the rate position. With the mix switch in the forward position, hold up elevator and press the (+) key until a 35% value is achieved. Up should result in down flaps. If the flap goes up, reverse the 35% value from a +35 to a -35 using the (-) key. Now hold down elevator with the control stick and press the (+) key until 35% is achieved. The flaps should go up. Reverse the value if necessary until up elevator gives down flaps and down elevator gives up flaps. Later you can experiment with more or less flap throw by changing this value. 35% is a good, safe place to start.

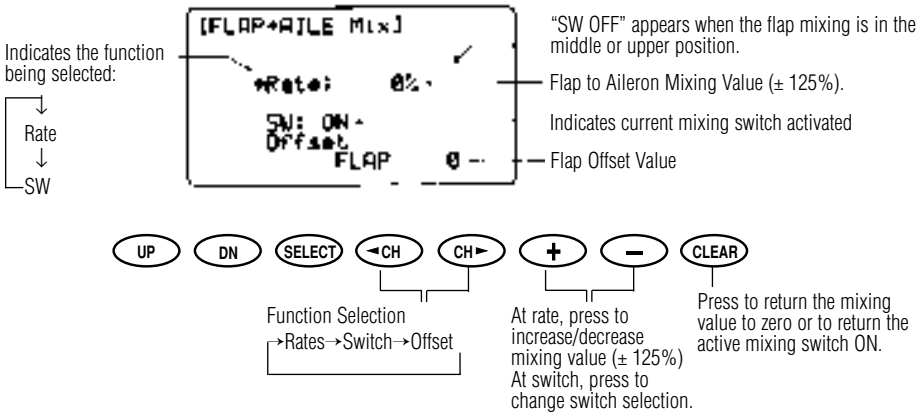


Step 11. Aileron-to- mixing: Press the *Up* key until the "AILE-FLAP Mix" screen appears. Press the *CH* key to move the cursor to the "SW:" position. The "SW:" allows you to select which switch is used to turn on/off the aileron-to-flap mix. Pressing the (+) key will select one of the following switches: MIX = mix switch located on the back right of the transmitter, FLP-D = flap switch down, F-U&D = flap switch up and down, and ON = always on.

We recommended putting the aileron-to-flap mix on the mix switch so the mix can be turned off independently from the flaps. After selecting "MIX," press the *CH* key to return the cursor to the "Rate" position. Now press the (+) key until +100% value is reached. Now the flaps should move in unison in the same direction with the ailerons. If they move in opposite directions, press the (-) key until a -100% value is reached.

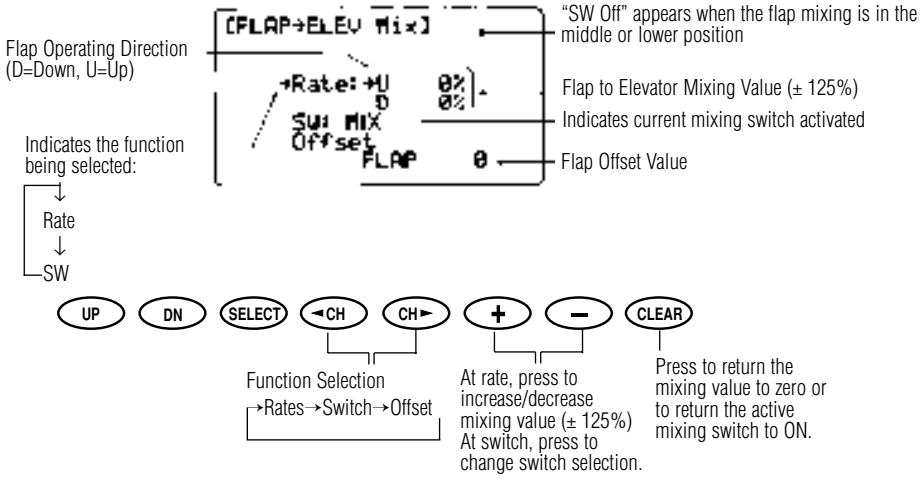
Section 19: Programming Guide — JJR XP8103

Step 12. Setting up Crow: Crow will be assigned to the flap switch and will be activated when the switch is in the down position. We've already set the flaps to the proper down position in Step 8 travel adjust. Now we need to add the ailerons up 3/4" and the elevator down 5/8".



Step 13. Flap-to-aileron mixing: Press the *Up* key until the mix "FLAP-AILE" screen appears. Now press the *CH* key to move the cursor to the SW: position (flap-to-aileron switch selection). Press the (+) key until "FLP-D" (flap down) appears in the screen. Now press the *CH* key twice to return the cursor to the RATE position. Move the flap switch to the down position. Next press the (+) key until both the ailerons go up 3/4". If the ailerons go down, press the (-) key.

Note: The flap switch must be in the down position to change the rate value.



Step 14. Flap-to-elevator mixing: In Function mode, press the *Up* key until the mix "FLAP-ELEV" appears on the screen. Next press the *CH* key to move the cursor to the SW (flap-to-elevator switch selection) position. Press the (+) key until the "FLP-D" (flap down) appears on the screen. Now press the *CH* key to return the cursor to the "Rate" position. With the flap switch in the down position, press the (+) key until the elevator comes down 1/4". If the elevator goes up, use the (-) key to reverse this.

Section 19: Programming Guide — JJR XP8103

CONTINUED

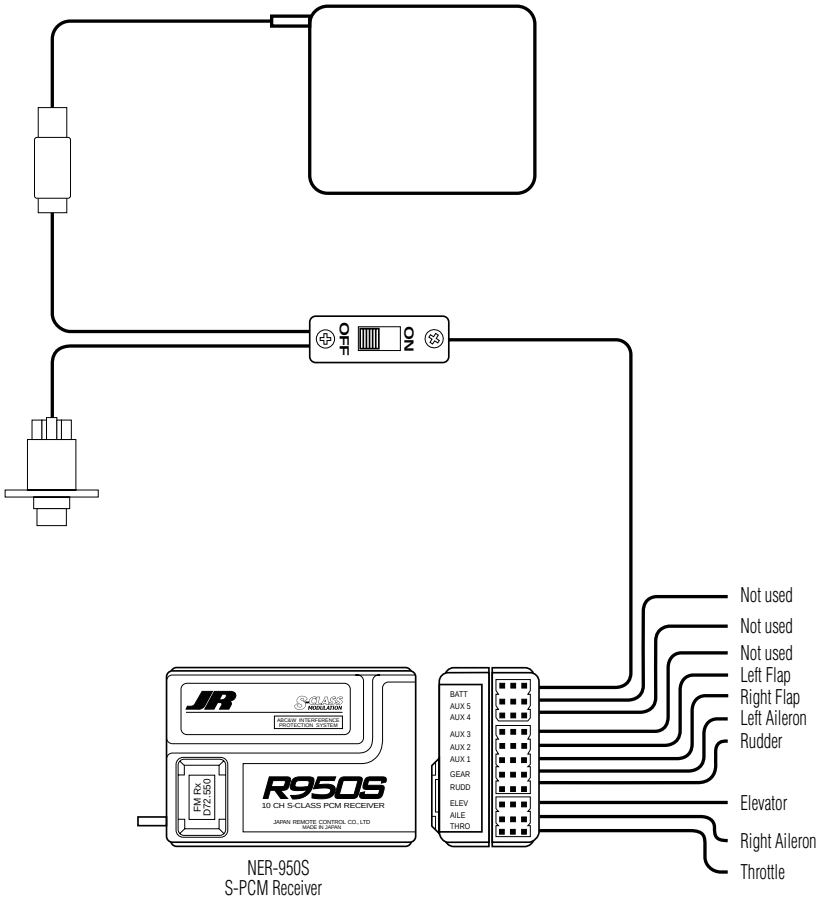
Flap Switch
UP = Normal
MID = Takeoff flaps
DOWN = Crow

Mix Switch = Turns on/off aileron-to-flaps and elevator-to-flaps mixes

Section 19: Programming Guide — JR 10X/10SxII/10Sx

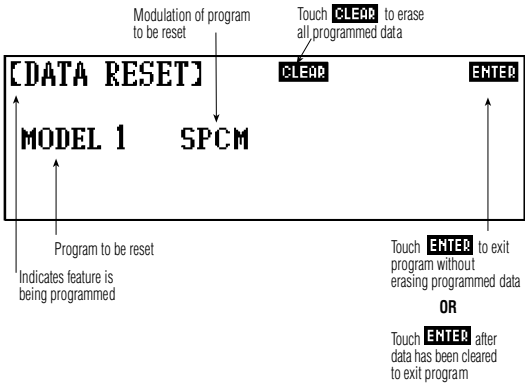
Programming your JR10X, 10SxII or 10Sx in 11 Easy Steps

JR's 10X, 10SxII and 10Sx feature many of the same base-level programming features, making programming and setting up the quad flap function on these radios identical. First, it's important to plug each servo into the correct port in the receiver.



NER-950S
S-PCM Receiver

Note: When setting up a new aircraft, it's important to reset the programming to the factory defaults.



Step 1. Data Reset, Code 28: Enter Code 28 and press the *Clear* key to reset the programming to factory default settings. (The 10X will require you to verify that you want to reset with a yes or no — press YES).

Section 19: Programming Guide — JR 10X/10SxII/10Sx

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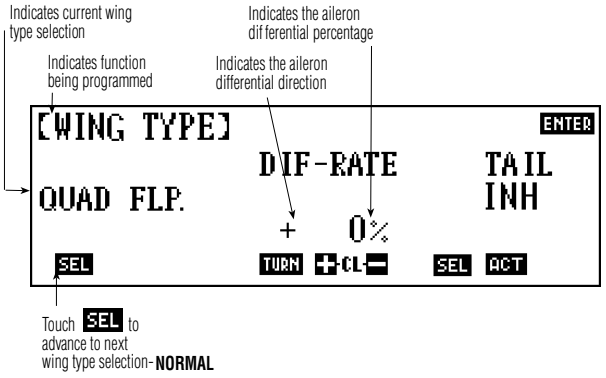
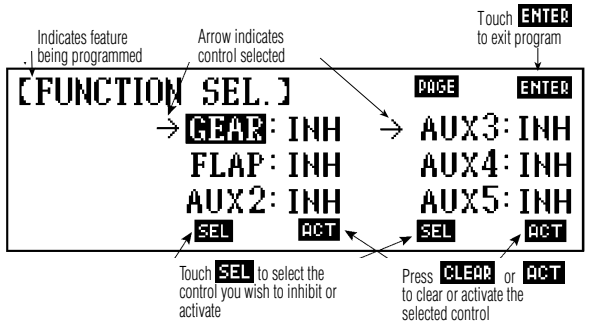
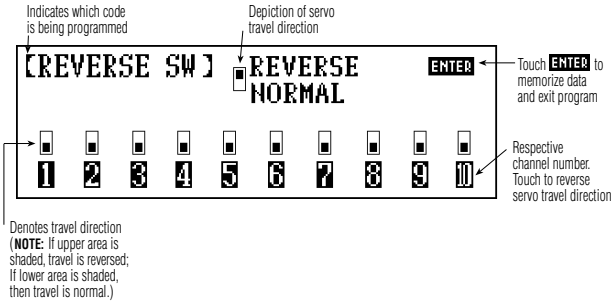


Step 2. Wing Type, Code 22: Enter Code 22 and below normal press the *SEL* key until QUAD.FLP appears. Press *Enter* to return to the Function mode screen.

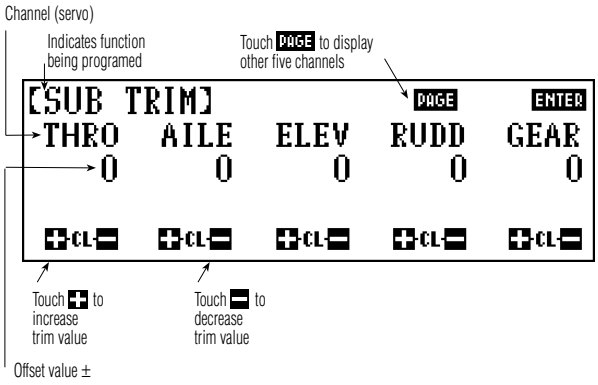


Step 3. Turn off unused channels, Code 17: Enter Code 17 and inhibit channels 5 through 10 by pressing the *SEL* key to select each channel, then press the *Clear* key to inhibit each channel.

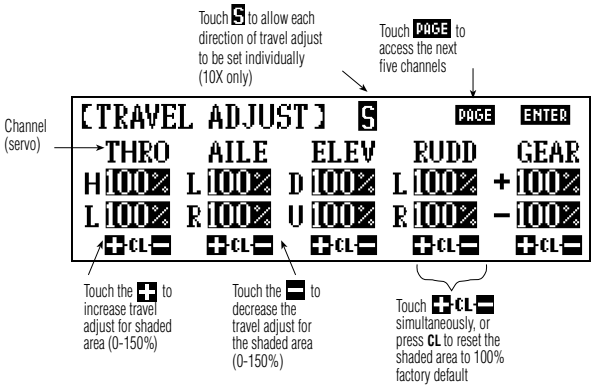


Step 4. Set the servo reversing, Code 11: Enter Code 11 and check that the direction of each servo is moving properly. Reverse any servo as necessary by pressing the numbered key that corresponds with that channel.

1 — Throttle
2 — Right Aileron
3 — Elevator
4 — Rudder
5 — Left Aileron
6 — Right Flap
7 — Left Flap



Step 5. Sub-Trims, Code 15: Turn on the transmitter and receiver and center the trims on the transmitter. Reposition any of the control arms as necessary such that the control surfaces are as close to neutral as possible. Now enter "Code 15, Sub-Trim" and fine adjust each control surface until it's perfectly neutral using the (+) or (-) keys below each corresponding channel. The *Page* key allows access to the other five channels. Pressing *Enter* will return to the Function mode.



Step 6. Travel Adjust, Code 12: Enter Code 12 and adjust the control travels of each control surface to the following using the (+) or (-) key below each channel. Pressing the *PAGE* key will access the other five channels.

Throttle — Full open to full closed with trim
Aileron — 1 1/4" up, 1 1/4" down
Elevator — 7/16" up, 7/16" down
Rudder — 3" right, 3" left

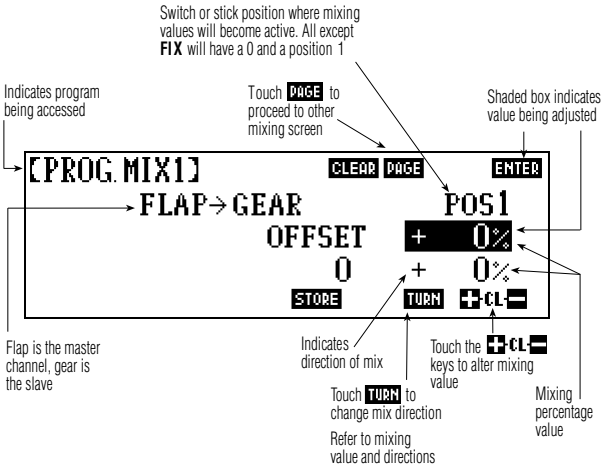
Section 19: Programming Guide — JR 10X/10SxII/10Sx

Step 7. Dual Rate and Exponential, Code 13: Enter Code 13. The *Page* key will allow you to select the aileron, elevator and rudder channels while each respective dual rate switch will allow you to select positions 0, 1, or 2 for that channel. Adjust the high rates to 100%, the middle rates to 75% and the low rates to 50% for all three channels. First flights should be made at a low 50% rate.

Exponential is used to reduce the control sensitivity around center while still providing full control authority when the control stick is fully deflected. Because the Ultra Stick™ 40 has large recommended control throws, it's a good idea to give expo a try, even if you've never used it before, to prevent over-controlling. With the PCM-10 channel radios, exponential adjusts exactly like dual rate. Select the desired channel using the *Page* key, then select the switch position using the corresponding dual rate switch, then use the (+) or (-) key to adjust the expo value. We recommend 30% as a good starting point for all channels and positions.

Later you can fine-tune the control feel to your liking after several test flights.

Step 8. Flap System, Code 66: Enter Code 66. Move the flap switch to the mid-position and below the "FLAP MID" on the right side of the screen, press the (-) key until the flap comes down 1 1/4". Next, move the flap switch to the down (land) position and, below the "FLAP LAND" on the right side of the screen, press the (-) key until the flaps come down 1 5/8". With the flap switch still in the down position, press the (+) key below "ELEV LAND" until the elevator comes down 5/8". We have just setup the takeoff flaps (switch in the center position) and the first part of the crow (switch in the lower position).



Step 9. Programmable mix for up ailerons in crow, Code 51: We will need to set up a programmable mix to allow the ailerons to move upward when crow is activated. Enter Code 51, Programmable Mix 1. Press the "6" key and then the "5" key at the bottom of the screen to select the FLAP as the master and the GEAR as the slave channels.

Next, press *Enter*. Now press *Page* to access the switch selection screen and press the key below the LD to select the *LAND* switch position to turn on the mix. Press the *Page* key twice to return to the mix screen. Move the flap switch to the lower (LAND) position, then press the (+) key until the ailerons go up 3/4". If the ailerons go down, press the *Turn* key.

Section 19: Programming Guide — JR 10X/10SxII/10Sx

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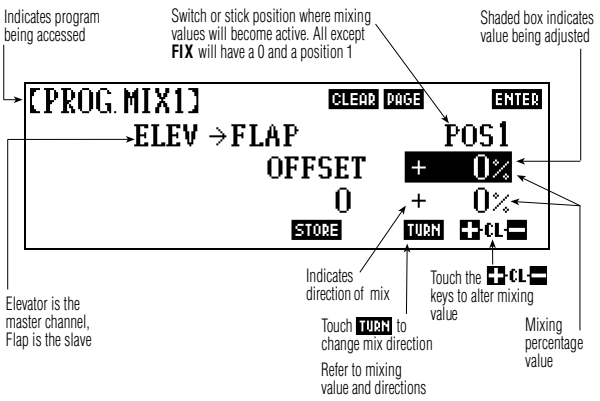
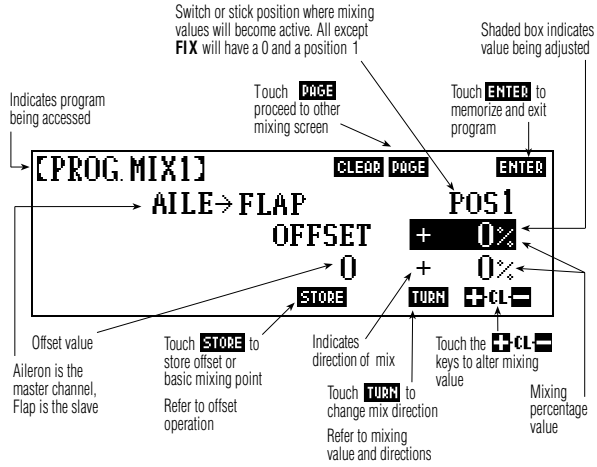


Step 10. Programmable mix for elevator-to-flap, Code 52: Enter Code 52, Programmable Mix 2, and press the "3" key and then the "6" key to select the ELEVATOR as master and the FLAPS as slave channels. Press *Enter*, then press the *Page* key to select the switch screen. Below MX press the *SEL* key to select the mix switch to operate the mix. This will allow the elevator-to-flap mix to be turned on/off using the mix switch. Press the *Page* key twice to return to the mix screen. With the mix switch (back right side of transmitter) in the forward position, hold up elevator and press the (+) key until the flaps go down. If the flaps go in the wrong direction, press the *Turn* key. Mixing percentage value of 35% is a good place to start. Now with down elevator, press the (+) key until the flaps go up. Also use 35% as a starting point here. Later you can adjust these values to suit your flying style.



Step 11. Programmable mixing of aileron-to-flaps, Code 53: Enter "Code 53, Programmable Mix 3." Press the "2" key and then the "7" key to mix aileron to AUX 2, then press *Enter.* Press the Page key to access the switch select screen and press the *SEL* key below MX. This will turn on/off the aileron-to-flap mix with the mix switch (located at the back left of the transmitter). Press the *Page* key twice to return to the "Programmable Mix 3" screen. With the mix switch in the forward position, press the (+) key while holding the right aileron control stick until the value reads 100%. If the flap moves opposite the aileron, then press the *Turn* key. Now holding left aileron with the control stick, press the (+) key until 100% is achieved. Press the *Turn* key if necessary.

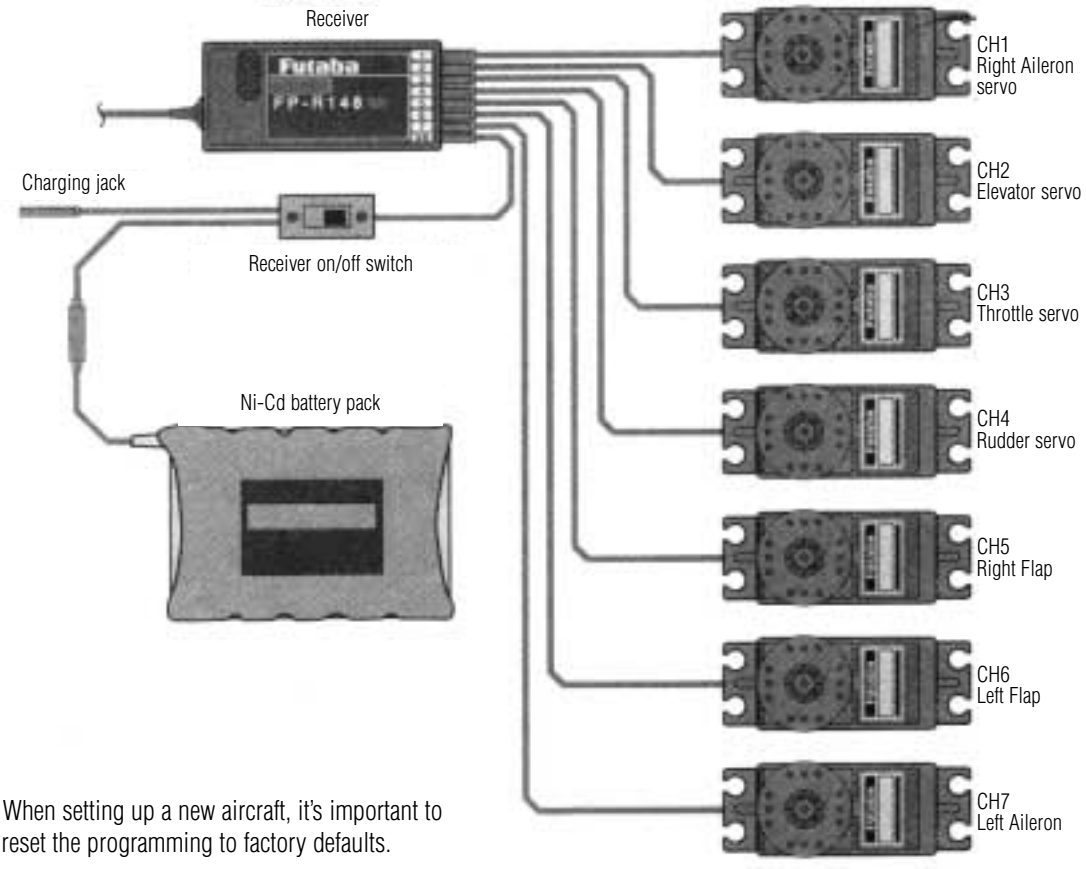
* Flap Switch
UP = Normal
MID = Takeoff flaps
DOWN = Crow

* Mix Switch = Turns on/off aileron-to-flap and elevator-to-flap mixes

Section 19: Programming Guide — Futaba 8UA/S

Programming the Futaba 8UA/S in 10 Easy Steps

Before programming your radio, it's important to plug each servo into the correct servo port in the receiver.



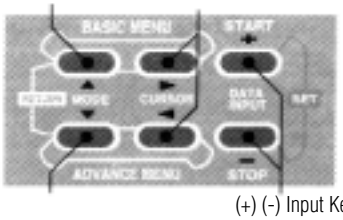
Note: When setting up a new aircraft, it's important to reset the programming to factory defaults.

Indicates NORM or REVERS throw setting

Confirmation message "OK?"

MODEL DATA RESET
Press both the (+) and (-) keys simultaneously. The confirmation message "OK?" is displayed at the top left corner of the screen. When both (+) and (-) are pressed simultaneously again, the reset process is begun. After a beep, beep, beep tone is sounded, a continuous beep tone indicates that the reset is complete.

These keys are used to move through submenus in the PARA function.



(+) (-) Input Keys

Step 1. Data Reset: Turn on the transmitter and press the two *Basic Menu* keys simultaneously. Now press one of the *Mode* keys to access the "PARA" (parameters) screen. Press the *Cursor* key to select the "DATA RSET" screen. When the "DATA RSET" screen is displayed, pressing the (+) and (-) keys simultaneously will bring up "OK?" on the screen. To reset the memory again, press the (+) and (-) keys simultaneously.

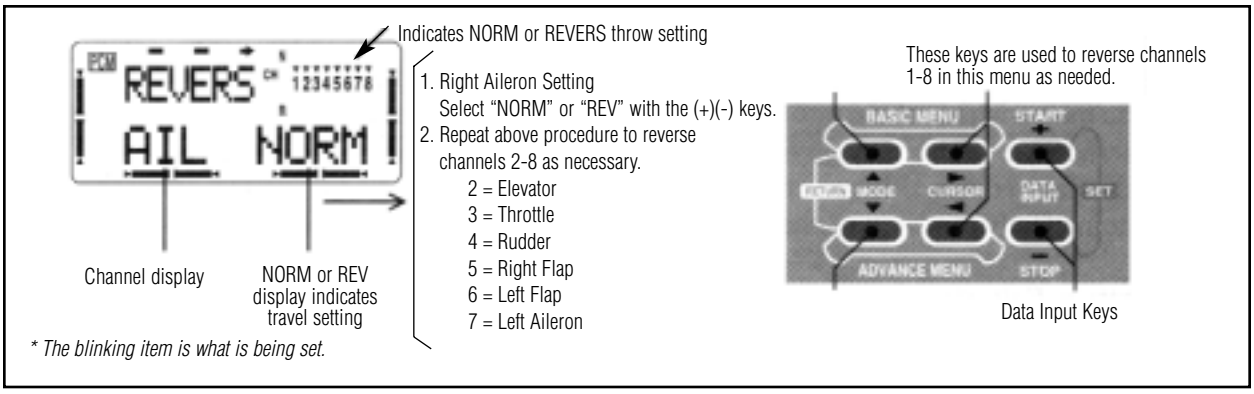
Most of the quad flap features needed for the Ultra Stick™40 are already preprogrammed into the glider software (referred to as GLID 2FLP) included in the Futaba 8UA.

While the Ultra Stick 40 is not a glider, there are several built-in features in the glider programming that make quad flaps easier to program and use. We strongly suggest using the GLID 2FLP model type programming in these radios when setting up quad flaps.

Section 19: Programming Guide — Futaba 8UA/S

CONTINUED

Step 2. Selecting model type (GLID): Press the two *Basic Menu* keys simultaneously to enter the basic programming mode. Now press *Mode* key until "PARA" (parameters) appears on the screen. Press a *Cursor* key until "TYPE" appears on the top of the screen. Next press the (+) button until "GLID 2FLP" is displayed. With "GLID 2FLP" displayed on the screen press the (+) and (-) key simultaneously twice to access the Glider 2 flaps program.



Step 3. Setting the servo reversing: In the BASIC MENU mode, press the *Mode* key until the "REVERS" screen appears. The *Cursor* key allows you to access the different channels, while pressing the (-) key reverses the selected channel (the (+) key changes that channel back to normal). Check that all channels are moving in the proper direction and reverse as necessary.

Note: The throttle is referred to as ABK (air brake) in the glider mode and functions normally with the throttle stick and trimmer.

Don't worry about the flap direction at this time.

Step 4. Turning off the flap trim knob (Ch. 6): Press the *Advance Menu* keys simultaneously to enter the Advanced Menu mode. Now press the *Mode* key until "FLPTRM" appears on the screen. Press the (+) button to turn on the flap trim function. Now press the *Cursor* so that the +30 value is blinking. Press the (-) key until a "0" appears in the screen.

Section 19: Programming Guide — Futaba 8UA/S

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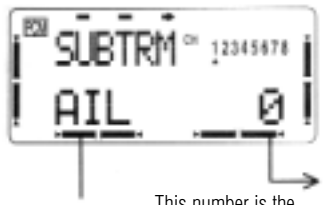


Channel Being Set (Aileron)

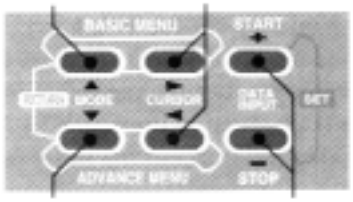
This number is the subtrim value (allowed to be -120 to +120) (Default value = 0).

Setting Sub-Trims

- Begin with the Aileron subtrim. Use the (+) and (-) keys to neutralize the control surface.
- Adjust the remaining controls (when used) in a similar fashion: Elevator, Throttle, and Rudder.

If you're unhappy with subtrim value, you may reset it to zero by pressing the (+) and (-) keys simultaneously.

Choose channels 1-8 with these keys.



Use these keys to set subtrims.

Step 4. Adjusting sub-trims: With the transmitter and receiver turned on and the trims centered on the transmitter, reposition the servo arms as necessary so that all control surfaces are as close to neutral as possible. Now press the two *Basic Menu* keys to enter Basic mode. Press the *Mode* key to access the "SUBTRM" screen. While in the "SUBTRM" screen, pressing the *Cursor* key will scroll through channels and then pressing the (+) or (-) key will adjust the sub-trim values. Adjust the sub-trims for each channel until each control surface is perfectly neutralized.

Note: The throttle channel is referred to as ABK (air brake) in the glider mode and functions normally with the throttle stick and trim.

Step 5. Setting up Crow (also referred to as butterfly): Press the *Advance Menu* keys simultaneously to enter the Advanced Menu mode. Now press the *Mode* key until "BFLY" appears on the screen. Press the (+) key to activate butterfly programming. Next press the *Cursor* to access the AIL function and, with the A switch (top left corner) in the down position, adjust the value using the (+) or (-) key until the ailerons are up 3/4". Now press the *Cursor* key until the "FLP" appears on the screen and adjust the value using the (+) or (-) key until the left aileron is up 3/4". Now press the *Cursor* key until the "ELE" appears on the screen and adjust the value until the elevator goes down 5/8". Next press the *Cursor* until "FLP" appears on the screen and adjust the value until the flaps go down 1 5/8". This presets the ailerons, flaps and elevator for Crow and it is activated on switch A.

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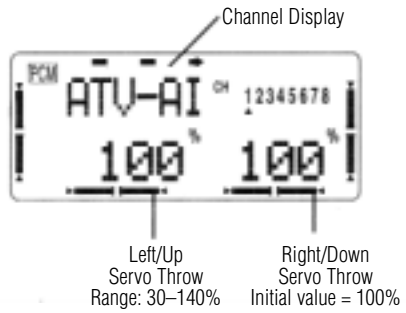
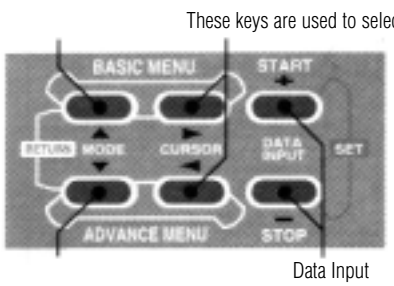


** The blinking item is what is being set.*



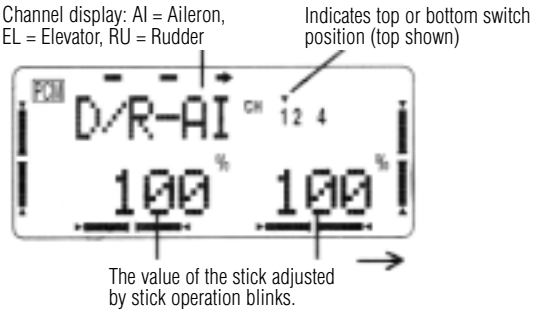
You can reset to the initial values by pressing the (+) and (-) keys simultaneously.

Channel display

No.	Channel Name	No.	Channel Name
CH1	AI = Right Aileron	CH5	Right Flap
CH2	EL = Elevator	CH6	FL = Left Flap
CH3	TH = Throttle	CH7	Channel 7 Left Aileron
CH4	RU = Rudder		

Step 6. Adjusting the travel volume: Press the two *Basic Menu* keys simultaneously to enter the Basic mode. Now press the *Mode* key until the "ATV" (adjustable travel volume) screen appears. Pressing the *Cursor* key will advance through the channels, while pressing the (+) or (-) key will increase or decrease the travel of that channel. It's necessary to adjust each direction of each channel by moving that selected channels stick in the desired direction. Adjust each channel to the following.

Throttle — Full open to full closes with trim
Aileron — 1 1/4" up, 1 1/4" down
Elevator — 1 7/16" up, 1 7/16" down
Rudder — 3" right, 3" left



Step 7. Setting dual rates: In Basic mode press the *Mode* key until the "D/RE" screen appears. This is the dual rate program. Press the *Cursor* to access the aileron, elevator or rudder channels, then press the (+) or (-) key to change the values. Note that two dual values are available by toggling that channel's dual rate switch. On all three channels, high rate should be adjusted to 100%, while low rate should be set at 50%.

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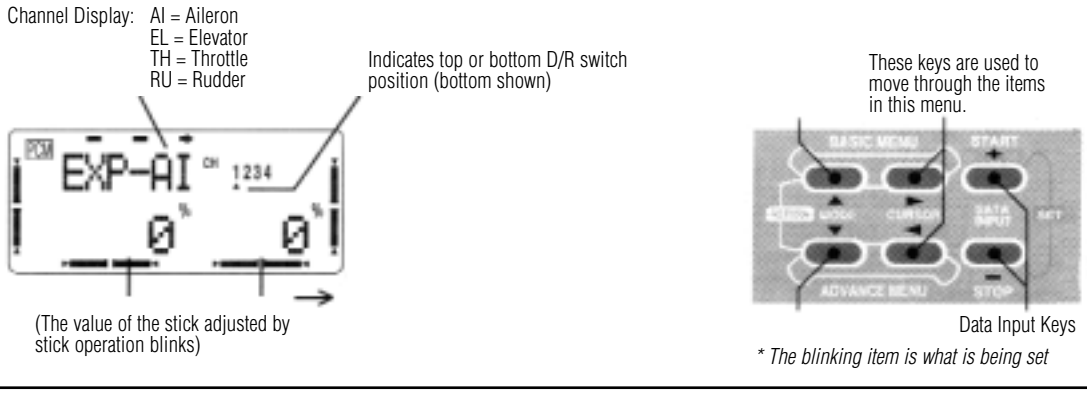
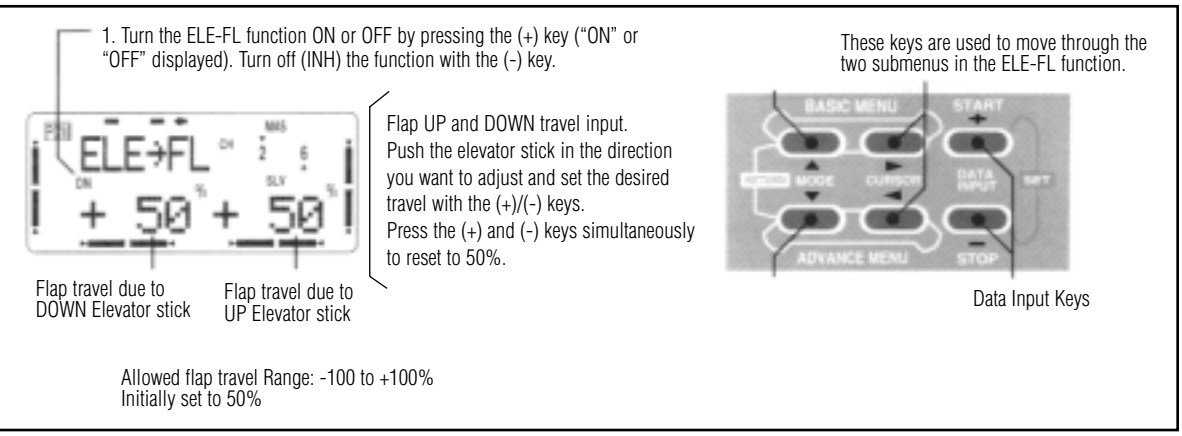


Step 8. Setting the exponential adjustments: Exponential is used to reduce the control sensitivity around center while still providing full control authority when the control stick is full deflected. Because the Ultra Stick™ has large recommended control throws, it's a good idea to give expo a try, even if you've never used it before, to prevent over-controlling. In Basic mode, press the *Mode* key until the "EXP" function appears on the screen. Pressing the *Cursor* key will allow access of the aileron, elevator, rudder and AB (throttle) channels. Toggling the respective dual rate switch will allow one of two expo values to be stored. It's recommended that a -30% expo be programmed for aileron, elevator and rudder as a good starting point. Later after several test flights you can fine-tune the control feel to your liking.



Step 9. Elevator-to-flap mixing: Press the Advance Menu keys simultaneously to access the Advanced Menu mode. Next press the *Mode* key until "ELE-FL" (elevator-to-flaps) appears on the screen. Press the (+) key to activate elevator-to-flaps. With flap switch C in the up position (ELE-FLP), press the *Cursor* key until the value is blinking. Then use the (+) or (-) key while holding the elevator stick in the desired up or down position to change the values so that up elevator gives down flaps and down flaps gives up elevator. A value of 35% in both directions is a good place to start.

Note: If the flaps travel in the wrong direction when elevator is applied, reverse the value using the (+) or (-) key.

E.G., +35% to -35%. The ELE-FLP switch is used to turn on/off this function.

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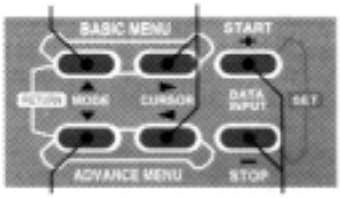
1. Turn the AIL-FL function ON or OFF by pressing the (+) key ("ON" or "OFF" displayed depending on switch G's position). Turn off (INH) the function with the (-) key.

Aileron Mix from Flaps | Flap Neutral Position

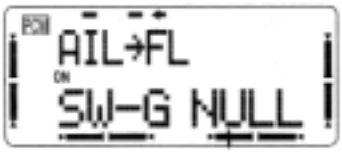
Range: -100 to +100% (initial value: 0%)

2. Flap travel setting
   Push the aileron stick in the direction you want to adjust and adjust the flap amount with the (+) and (-) keys. Repeat for other aileron stick position.
   - If you're unhappy with what you've set, you may return to the default value by pressing the (=) and (-) keys simultaneously.

These keys are used to move through the three submenus in the AIL-FL function.



Data Input Keys



Switch direction display (NULL, UP, DOWN)

3. Activation Switch Direction/Disabling
   Select the desired direction for Switch G to turn the function on and off with the (+)/(-) keys.
   "UP" = Upper position turns on AIL-FL mixing
   "DOWN" = Lower position turns on AIL-FL mixing
   "NULL" = AIL-FL mixing is always on, switch disabled.

Step 10. Aileron-to-flap mixing: In Advanced Menu Mode, press the *Mode* key until the "AIL-FL" screen appears. Next press the + button to activate the aileron-to-flap mixing. Press the *Cursor* so that the 0 value is blinking. Now press the (+) or (-) keys while holding right then left aileron until the flap moves in unison with the ailerons. A starting value of 50% is a good place to start. Now press the *Cursor* key until "SW-E" appears and press the (+) key until "Down" appears on the screen. This assigns the aileron-to-flap mix to the E switch, and it's on when the switch is pulled forward.

AMA SAFETY CODE

1994 Official AMA National Model Aircraft Safety Code Effective January 1, 1999.

Model flying MUST be in accordance with this Code in order for AMA Liability Protection to apply.

General

1. I will not fly my model aircraft in sanctioned events, air shows, or model flying demonstrations until it has been proven to be airworthy by having been previously, successfully flight tested.

2. I will not fly my model higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right-of-way and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft.

3. Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless, and/or dangerous manner.

4. At all flying sites, a straight or curved line(s) must be established in front of which all flying takes place, with the other side designated for spectators. Only personnel involved with flying the aircraft are allowed in front of the flight line. Flying over the spectator side of the line is prohibited, unless beyond the control of the pilot(s). In any case, the maximum permissible takeoff weight of the models is 55 pounds.

5. At air shows or model flying demonstrations, a single straight line must be established, one side of which is for flying and the other side for spectators. Only those persons accredited by the contest director or other appropriate official as necessary for flight operations or as having duties or functions relating to the conduct of the show or demonstration are to be permitted on the flying side of the line. The only exceptions which my be permitted to the single straight line requirements, under special circumstances involving consideration of side conditions and model size, weight, speed, and power must be jointly approved by the AMA President and the Executive Director.

6. Under all circumstances, if my model weighs over 20 lb, I will fly it in accordance with paragraph 5 of this section of the AMA Safety Code.

7. I will not fly my model unless it is identified with my name and address or AMA number, on or in the model. **Note:** This does not apply to models flown indoors.

8. I will not operate models with metal-bladed propellers or with gaseous boosts, in which gases other than air enter their internal combustion engine(s); nor will I operate models with extremely hazardous fuels such as those containing tetranitromethane or hydrazine.

9. I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind) including, but not limited to, rockets, explosive bombs dropped from models, smoke bombs, all explosive gases (such as hydrogen-filled balloons), ground mounted devices launching a projectile. The only exceptions permitted are rockets flown in accordance with the National Model Rocketry Safety Code or those permanently attached (as per JATO use); also those items authorized for Air Show Team use as defined by AST Advisory Committee (document available from AMA HQ). In any case, models using rocket motors as primary means of propulsion are limited to a maximum weight of 3.3 pounds and a G series motor. **Note:** A model aircraft is defined as an aircraft with or without engine, not able to carry a human being.

10. I will not operate any turbo jet engine (axial or centrifugal flow) unless I have obtained a special waiver for such specific operations from the AMA President and Executive Director, and I will abide by any restriction(s) imposed for such operation by them. **Note:** This does not apply to ducted fan models using piston engines or electric motors.

11. I will not consume alcoholic beverages prior to, nor during, participation in any model operations.

Radio Control

1. I will have completed a successful radio equipment ground range check before the first flight of a new or repaired model.

2. I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.

3. I will perform my initial turn after takeoff away from the pit or spectator areas, and I will not thereafter fly over pit or spectator areas, unless beyond my control.

4. I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission. (Only properly licensed amateurs are authorized to operate equipment on Amateur Band frequencies.)

5. I will not knowingly operate an R/C system within 3 miles of a pre-existing model club-flying site without a frequency sharing agreement with that club.

6. I will not fly my model aircraft in any racing competition, which allows models over 20 pounds unless that competition event is AMA sanctioned.(Competition here is defined as any situation where a winner is determined.)

7. Every organization racing event requires that all officials, callers, and contestants must properly wear helmets, which are OSHA, DOT, ANSL, SNELL, NOCSAE, or comparable standard while on the racecourse. In addition, all officials occupying safety cages must wear protective eyewear.

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